This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

+ *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.

+ *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.

+ *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.

+ *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at `http://books.google.com/`

Edu. T 358.85,245

HARVARD COLLEGE
LIBRARY

GIFT OF THE
GRADUATE SCHOOL
OF EDUCATION

3 2044 097 027 080

PRACTICAL WORK IN THE SCHOOL-ROOM.

Part 3.

OBJECT LESSONS ON PLANTS:

AN

ELEMENTARY BOTANY FOR PRIMARY, INTERMEDIATE, AND GRAMMAR GRADES;

INCLUDING

A TRANSCRIPT OF LESSONS GIVEN IN PRIMARY DEPARTMENT, GRAMMAR SCHOOL NO. 49, NEW YORK CITY.

NEW YORK:
A. LOVELL & COMPANY.
1885.

EA.L.T 358.85.245
✓

HARVARD COLLEGE LIBRARY
GIFT OF THE
GRADUATE SCHOOL OF EDUCATION
Jan 9, 1931

Entered according to Act of Congress, in the year 1885, by
SARAH F. BUCKELEW AND MARGARET W. LEWIS,
in the Office of the Librarian of Congress, at Washington.

J. S. CUSHING & Co., PRINTERS, BOSTON.

NOTE TO TEACHERS.

ALTHOUGH plants are among the most common things of every-day life, to multitudes they are attractive only because of their bright colors, beautiful forms, delightful fragrance, or usefulness to mankind. To some, however, and the number is increasing, they are the source of higher enjoyment, as the careful examination of their parts and structure reveals wonders and beauties unnoticed by the uncultured eye.

Again: many of the simple facts known concerning plants which have taken scientists centuries to discover, may now be learned by any one who will study what may be called *two dictionaries;* one explaining the terms used in the description of plants, the other teaching the method by which they are classified.

These dictionaries contain many long words of Greek or Latin origin which are very formidable to beginners, but by illustration and repetition may become as familiar as the most ordinary words and phrases in daily use.

The purpose of this little book is to aid in *educating children to observe and enjoy the hidden beauties of flowers.* It is also intended to serve as an illustrated dictionary of the most common botanical terms, and to prepare the older pupils to use the second dictionary, found in the Analytical Keys to the Natural Orders of Plants, as given in advanced botanies.

PLAN OF THE LESSONS.

THE Lessons are arranged in four parts, as follows:—

PART I. Lessons and Plans for Lessons designed to be taught in Primary and Intermediate Grades.

PART II. Lessons prepared for classes in the lower Grammar Grades. The *examples* under the headings are not to be memorized; they are given to suggest the plants which will serve to illustrate the subjects to which they apply. *Example:* Under Fibrous Roots will be found grass, lily, etc. The pupils should be encouraged to gather specimens of the various kinds of leaves, corollas, and other parts of plants, whenever it is possible for these to be obtained.

PART III. Blackboard Outlines drawn mostly from the lessons in Part II.; and a full outline showing the Classification of Plants according to the Natural System, as taught in the standard text-books of botany used in this country; also a short History of Plants, Botany, and Botanists.

PART IV. In this part may be found lists of the most familiar trees, shrubs, vines, and other kinds of plants. They have been arranged after a peculiar plan to aid those who have not much time at command, and are to be used as an honest teacher would use a key to an arithmetic or an algebra.

TABLE OF CONTENTS.

PAGE

NOTE TO TEACHERS iii
PLAN OF THE LESSONS v

PART I.

FOR PRIMARY GRADES.

INTRODUCTORY LESSON, For Beginners in Sixth Grade 2
SHAPES OF FLOWERS, Sixth Grade 4
THE FLOWER VASE, Special Lesson I. 6
SHAPES OF FLOWERS — *Continued*, Fifth Grade 7
THE PINK, Fifth and Fourth Grades 10
THE ROSE, Fifth and Fourth Grades 12
THE LILY, Fourth Grade 12
USES OF PLANTS, Special Lesson II. 14
PARTS OF PLANTS USED FOR FOOD, Special Lesson III. 15
THE PARTS OF A PLANT DESCRIBED, Second Grade 18
LEAVES, Fourth and Third Grades 21
LEAVES — *Continued*, Third and Second Grades 27
SPECIMENS OF THE PARTS OF A PLANT, Second Grade 38
THE PARTS OF A FLOWER, First Grade 40
COROLLAS, First Grade 43
EXAMPLES OF OUTLINE DESCRIPTIONS 46
LESSONS ON ROOTS, ETC. 48
GENERAL OUTLINES 50

PART II.

FOR GRAMMAR GRADES.

DEFINITIONS AND ILLUSTRATIONS OF WORDS USED IN THE DESCRIPTION OF PLANTS.

Roots 56
Stems 61
Buds 66
Leaves 68

Definitions and Illustrations. — *Continued.*
Inflorescences 96
Corollas 102
Fruits 108
Seeds 114

PART III.

FOR GRAMMAR GRADES.

Outline Lessons.
Roots 118
Stems 119
Buds 120
Leaves 121
Inflorescences 124
The Blossom, or Flower 125
The Calyx and the Corolla 127
Stamens 128
Pistils 130
Fruits and Seeds 131
The Vegetable Kingdom 132
A History of Plants, Botany, and Botanists 143

PART IV.

The Use of Latin Nomenclature 150
Derivation of the Names of Plants 150
Rules for Capitals and Accents 151
Classified Lists.
Trees, Shrubs, Fruit-trees, Fruit-shrubs, and Nut-trees 152
Kitchen-garden Plants 157
Vines and Bulbous-rooted Plants 160
Garden Flowers 162
Wild Flowers and Weeds 165
Ferns, Mosses, etc. 169

PART I.

FLOWERS.

"A blessing given
E'en to the poorest little one
Who wanders 'neath the vault of Heaven.

"Each bud and care-perfected seed
Is as a page, where we may read of God."

THE following lessons are more easily taught during the season when plants and trees are in blossom, yet they may be made very interesting and profitable at any time, by careful teaching, with the aid of pictures and pressed leaves or flowers.

LESSON I.

BLACKBOARD OUTLINE.

PLANTS.

Names.	*Where seen.*	*Parts.*	*Needs.*	*Color of Flowers.*	*Use.*
Roses.	Garden.	Root.	Earth.	Red.	Some are food for us.
Daisies.	Church.	Stem.	Air.	White.	" " food for beasts.
Geraniums.	Greenhouse.	Stalk, or trunk.	Water.	Blue.	" " food for birds.
Violets.	Market.	Branches { boughs, twigs.	Sunlight.	Yellow.	" " food for insects.
Heliotrope.	Woods.		Sun-heat.	Purple.	" " for shade.
Mignonette.	Field.	Buds.	Care.	Orange.	" " for medicine.
Oak trees.	Meadow.	Leaves.		Pink.	They please us by their { sweet smell, beautiful shape, beautiful color.
Maple trees.	Pond.	Flowers, or blossoms.		Brown.	
Wheat.	Cemetery.	Fruit.		Variegated.	
Grape vines.	School.	Seeds.		Green (a few).	Some are for dyeing.
		Sap.			

COLOR OF FLOWERS.[1]

Red.	*Pink.*	*White.*	*Yellow.*	*Blue.*	*Purple.*
Some Roses.	(See list of red flowers.)	(See list of red flowers.)	Some Roses.	Forget-me-nots.	Some Lilies.
" Pinks.	Bleeding-heart.	Calla.	" Lilies.	Bluets.	Violets.
" Lilies.	Apple blossoms.	Strawberry blossoms.	" Pansies.	Harebells.	Some Pansies.
" Daisies.	Peach blossoms.	Blackberry blossoms.	" Dahlias.	Some Morning-glories.	Lilacs.
" Dahlias.	Some Azaleas.	Plum blossoms.	" Marigolds.	Flax blossoms.	Some Dahlias.
" Balsams.	" Everlastings.	Cherry blossoms.	Buttercups.	Some Lobelias.	" Balsams.
" Verbenas.	" Sweet Williams.	Some Pond-lilies.	Dandelions.	" Larkspurs.	Wistaria.
" Geraniums.	" Phlox.	Lilies-of-the-valley.	Sunflowers.		Some China asters.
" China asters.	Sweet-pea blossoms.	Deutzia.	Golden-rod.	*Orange.*	" Verbenas.
" Honeysuckles.	Some Begonias.	Sweet alyssum.	Toad-flax.	Nasturtiums.	" Morning-glories.
" Morning-glories.	Wild roses.	Snowballs.	Mustard blossoms.	Some Dahlias.	" Daisies.
" Four-o'clocks.	Sweet brier.	Tuberoses.	Ox-eyed daisies.	" Abutilons.	" Everlastings.
" Chrysanthemums.			Pumpkin blossoms.	" Marigolds.	" Petunias.

[1] These lists are not for the blackboard; they are only intended to be suggestive to the teacher.

Apparatus.— Natural or artificial specimens of five or six of the flowers named; pictures of flowers; the picture of an entire plant drawn on the blackboard; a living plant, when obtainable; specimens of the parts of a plant or tree.

Method of Teaching.— We ask about *the flowers the children have seen*, and *where they have seen them;* then show a plant in or out of the earth, or draw a picture on the board of a plant with all its parts. The children point out and name *the parts* with which they are familiar, and are taught those which they do not recognize.

They readily tell *what a plant needs* when we question them as to what they would do if a rose bush were given them and they wished it to live.

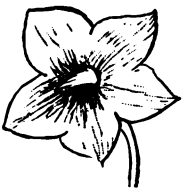
To obtain answers concerning *the color of flowers*, we let them give the color of those they have seen, and show them others, not only at this stage of the lesson, but from time to time during the school term. In this way their actual knowledge is increased, and they learn "to use their eyes" when they see flowers in gardens or elsewhere.

The *use of plants* is suggested by questioning the class about what is usually eaten for dinner beside meat; why bees and butterflies fly into and out of flowers; why sheep and cows like grassy places; why picnics are held in woods, etc.

Method of Recitation.— The headings of the Blackboard Outlines are printed or written; the children learn to read them at sight from the board. When a heading is underlined, the pupils answer according to the following

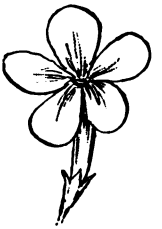
FORMULAS.

1. "I have seen a rose."
2. "I have seen some plants in a garden."
3. "A plant has a root."
4. "A plant needs earth."
5. "Some plants are used for food for us."
6. "Some roses are red."
7. "Some daisies are white."
8. "Forget-me-nots are blue."
9. "Some lilies are yellow."
10. "Some larkspurs are blue."
11. "Some marigolds are orange."
12. "Some violets are purple."



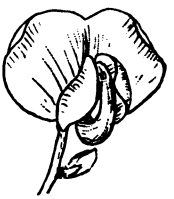
1.

2.



3.

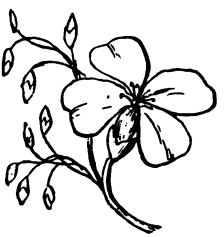
4.



5.

6.

7.



8.

9.

10.

11.

12.

1. Wheel-shaped. 4. Pink-shaped. 7. Trumpet-shaped. 10. Rose-shaped.
2. Funnel-shaped. 5. Butterfly-shaped. 8. Cross-shaped. 11. Bell-shaped.
3. Salver-shaped. 6. Lily-shaped. 9. Lip-shaped. 12. Strap-shaped.

SHAPES OF FLOWERS.

Apparatus.— Small flower pictures, one in the hand of each child; a tin funnel, a Maltese cross, a bell, a helmet, and a trumpet; a rose, lily, pink, and morning-glory, when these can be obtained; also pictures of these flowers. To these may be added pressed and artificial specimens of the flowers named on the next page.

Method of Teaching.— 1. We show the class the funnel; the children select from the flowers and from their pictures those which most resemble it in shape, and say of such: "*This flower looks something like the funnel;* the flower in my picture looks something like a funnel."

2. The picture of a lily is shown, and those stand whose pictures resemble it; each in turn states: "The flower in my picture looks like a lily." In like manner pink-shaped and rose-shaped flowers are selected.

3. The picture of a mustard blossom is shown, and compared with the funnel, bell, cross, etc.; the pupils notice that it "looks something like a cross," state the fact, and select pictures of flowers of the same shape.

4. In the same way they learn the various shapes of flowers with which we desire them to become familiar. When natural flowers are used in the lessons, the shape of these is decided upon by the children before they tell that of the pictures which represent the flowers.

Method of Recitation.— A child says to the class, "Tell the shape of the flowers in your pictures"; the children rise successively and give what is required in the formula, "The flower in my picture looks like a ——." (See 2 in Method of Teaching.)

When all the flowers have been described, a child, appointed to act as teacher, names a color; all who have flowers of this color rise and stand until another is mentioned. When all the colors have been named, the little teacher signals for those to be seated who are standing, then takes her own seat. This color exercise ends the lesson.

SHAPES OF FLOWERS.

1. Funnel-shaped.
2. Bell-shaped.
3. Lily-shaped.
4. Pink-shaped.
5. Rose-shaped.
6. Cross-shaped.
7. Butterfly-shaped.
8. Trumpet-shaped.
9. Lip-shaped.
10. Soldier's-cap shaped.

NAMES OF FLOWERS.

1. Morning-glory.
2. Harebell.
2. Lily-of-the-valley.
3. White lily.
3. Yellow lily.
3. Tiger lily.
4. Carnation.
4. China pink.
4. Mullein pink.
5. Wild rose.
5. Sweet brier.
5. Blackberry blossom.
5. Strawberry blossom.
5. Apple blossom.
5. Cherry blossom.
5. Pear blossom.
5. Peach blossom.
5. Plum blossom.
5. Quince blossom.
6. Mustard blossom.
7. Sweet-pea blossom.
8. Trumpet honeysuckle.
9. Sage blossom.
10. Aconite blossom.

SPECIAL LESSON I.

BLACKBOARD OUTLINE.

THE FLOWER VASE.

Names of Flowers.	*Shape.*	*Color.*	*Smell.*
Wild roses.	Rose-shaped.	Pink.	Fragrant.
Lilies.	Lily-shaped.	White; yellow.	Very fragrant.
Pinks.	Pink-shaped.	Red; white.	Very fragrant.
Morning-glories.	Funnel-shaped.	Red, white, etc.	Fragrant.
Petunias.	Funnel-shaped.	Purple; white.	Fragrant.
Mustard blossoms.	Cross-shaped.	Yellow.	Not fragrant.
Ox-eyed daisies.	Strap-shaped.	White and yellow.	Not fragrant.
Snapdragons.	Lip-shaped.	Purple.	Not fragrant.
Sage blossoms.	Lip-shaped.	Purple.	Not fragrant.

QUESTION-AND-ANSWER FORMULAS.

1. What flowers would you like for our flower vase? — "I would like some wild roses." "I would like some white lilies," etc.

2. What *shape* are the flowers you would like? — "Wild roses are rose-shaped." "White lilies are lily-shaped," etc.

3. What *color* are the flowers you would like? — "Wild roses are pink." "White lilies are white," etc.

4. What can you tell about the *smell* of these flowers? — "Wild roses are fragrant." "White lilies are fragrant," etc.

Method of Recitation.— A child asks the first question; the children reply individually, until a dozen or more flowers have been named. The question about *shape* is then asked, and the children describe the shape of the flowers they have named. So on for the *color* and *smell* of the flowers chosen.

SHAPES OF FLOWERS. — *Continued.*

Apparatus.— The same as for the previous lessons on Shapes of Flowers.

Method of Teaching.— 1. The lessons on page 5 are rapidly reviewed, after which the children are taught to say, "The flower in my picture is pink-shaped," instead of giving the statement, "The flower in my picture looks like a pink." So on for the various shapes.

2. We teach the names of the flowers in the picture in the order given below. The children give the statements: "The blackberry blossom is rose-shaped; the sage blossom is lip-shaped; the flowers of the sweet William are pink-shaped," etc.

3. We teach wheel-shaped from the potato blossom; salver-shaped from the flowers of the phlox, verbenas, lilacs, etc.; strap-shaped from the flowers of the asters, daisies, dandelions, etc.

Method of Recitation.— A child says to the class: "Tell the name and shape of the flowers in your pictures." The children rise successively and give what is required in the language of the formula, "The —— is —— shaped." (See 2.)

When all the flowers have been named, the color exercise is given as in the previous lesson on Shapes of Flowers. (See p. 5.)

SHAPES OF FLOWERS.

1. Funnel-shaped.
2. Bell-shaped.
3. Lily-shaped.
4. Pink-shaped.
5. Wild-rose shaped.
6. Cross-shaped.
7. Butterfly-shaped.
8. Trumpet-shaped.
9. Lip-shaped.
10. Wheel-shaped.
11. Salver-shaped.
12. Strap-shaped.

NAMES OF FLOWERS.

1. Morning-glory.
2. Harebell.
2. Lily-of-the-valley.
3. White lily.
3. Yellow lily.
3. Tiger lily.
3. Japan lily.
3. Philadelphia lily.
3. Tulip.
4. Carnation.
4. Mullein pink.
4. China pink.
4. Sweet William.
4. Bouncing Bet.
4. Ragged Robin.
4. Garden catchfly.
4. Virginia catchfly.
5. Wild rose.
5. Sweet brier.
5. Strawberry blossom.
5. Blackberry blossom.
6. Mustard blossom.
7. Sweet-pea blossom.
8. Trumpet honeysuckle.
9. Sage blossom.
10. Potato blossom.
11. Phlox.
12. China aster.

REVIEW LESSON.

How many of you have seen flowers?

Where have you seen flowers? — "In gardens," etc.[1]

What kind of flowers have you seen? — "Real flowers; made flowers."

What other name for real flowers? — "Natural flowers."

What other name for made flowers? — "Artificial flowers."

What do you mean by natural flowers? — "Flowers that grow; flowers that God makes."

What do you mean by artificial flowers? — "Flowers that people make."

What have you on your cards? — "Pictures of flowers."

Are the flowers in your pictures alike or different? — "They are different."

Why do you say they are different? — "Because they are not all the same color." "Because they are not all the same size." "Because they are not all the same shape."

Point to the stems in your pictures.

Point to the leaves.

Point to the flowers.

Tell the shape of the flowers in your pictures. — "Mine is shaped like a pink." "Mine is shaped like a rose." "Mine is shaped something like a trumpet," etc.; or, "Mine is rose-shaped," "Mine is lily-shaped," etc.

Those who have blue flowers in their pictures may stand; yellow; purple; orange; white; pink; red.[2]

---

[1] The answers to all the questions, except the fourth and fifth, are obtained from the children, not given them to be learned by rote. The words *artificial* and *natural* are explained, then used instead of the simple terms *made* and *real*.

[2] In this part of the lesson, those who have blue flowers stand until another color is mentioned; then those having this color stand until a third is named. So on for each color.

REVIEW LESSON.

BLACKBOARD OUTLINE.

Parts seen, etc.	*Parts of a Pink.*	*Parts of a Rose.*	*Parts of a Lily.*
1. Outside flower-leaves.	A long, slender, green cup.	A short, green cup.	None.
2. Inside flower-leaves.	Five; red.	Five; red.	Six.
3. Thread-like parts.	Ten, with little, purple heads.	A great many, with yellow heads.	Six, very long, with brown heads.
4. Thread-like parts in the centre.	Two, with curved heads.	A great many.	One.
5. Shape of flower.	Pink-shaped.	Rose-shaped.	Lily-shaped.

THE PINK, THE ROSE, AND THE LILY.

For the Lesson on the Pink.— Natural specimens of pinks and pink-shaped flowers, also artificial specimens; a representative picture of a pink, and small pictures of flowers of various shapes, including pink-shaped, one for each child. (See Prang's Natural History Series.)

For the Lesson on the Rose.— The same as for the pink, together with natural and artificial specimens; representative and small pictures of a rose and rose-shaped flowers. (See Prang's Natural History Series.)

For the Lesson on the Lily.— Natural and artificial specimens; representative and small pictures of lilies; also, the same of pink-shaped and rose-shaped flowers for comparison.

Method of Teaching.— The children are led to notice the color, the shape, and the number of the parts of the flower, and point to them when mentioned.

The term *thread-like* is easily obtained from *like a thread*, the description which the pupils usually give when questioned concerning the parts inside the flower-leaves. They always answer in their own language at first. We correct their replies, when necessary, to make these accord with the Review Lessons.

In comparing the rose with the pink, the children look carefully at each flower, then tell what they see *alike* and what *different* in the parts of each.

The same plan is pursued in studying the lily, which is not presented until the class is thoroughly familiar with the lessons on the pink and the rose.

Method of Recitation.— The teacher asks the questions; the pupils addressed reply, while others point to the *parts* of the specimens, or the representative picture, as these are mentioned.

When the questionings are ended, those having the pictures of flowers of the shape under consideration, stand. Each child gives the name and shape of the flower in her picture; thus:

"The mullein pink is pink-shaped; the flowers of the sweet William are pink-shaped; the strawberry blossom is rose-shaped; the Japan lily is lily-shaped."

THE PINK.

What is this? — "A pink (or the picture of a pink)."

What colors do you see in it? — "Red, green, white, purple."

Which parts are green? — "The stems, the leaves, the buds, and a part of the flower."

What may you call the green part of the flower? — "The cup."

What kind of a cup has the pink? — "A long, green cup."

Which part of the flower is red? — "The leaves."

What may you call them because they belong to the flower? — "The flower-leaves."

Count them.

How many flower-leaves has the pink? — "Five."

What else do you see in this pink, or in this picture of a pink? — "Some parts which look like threads."

What may you call them because they look like threads? — "Thread-like parts."

Count the thread-like parts.

How many thread-like parts has the pink? — "Twelve."

What do you notice about the thread-like parts? — "They are not all alike."

In what are they different? — "Some have little purple heads; some have curved heads."

How many have curved heads? — "Two."

How many have purple heads? — "Ten."

Tell what you see in the flower-part of the picture of the pink? — "I see in the pink (or in the flower-part of the picture of the pink) a long, green cup, five red flower-leaves, and twelve thread-like parts, ten of which have little purple heads."

What shape do you call the pink? — "Pink-shaped."

Those who have pictures of flowers shaped like a pink may stand.

Why do you say these flowers are shaped like a pink? — "Because they have five flower-leaves, and a long, green cup like the pink."

Name the flowers which are pink-shaped.

THE ROSE (Wild).

What is this? — "A rose (or the picture of a rose)."

In what is the rose like the pink? — "It has five flower-leaves and a green cup."

In what is the rose different from the pink? — "The pink has a long, green cup; the rose has a short, green cup."

In what else is the rose different from the pink? — "In the number of thread-like parts; in the length of the thread-like parts."

Tell about the difference in the thread-like parts of the rose and pink. — "The thread-like parts of the pink are long; those of the rose are short. The pink has ten thread-like parts with little purple heads; the rose has a great many thread-like parts with little yellow heads."

Tell what you see in the rose (or in the flower-part of the picture of the rose). — "I see in the rose (or in the flower-part of the picture of the rose) a short, green cup, five flower-leaves, and a great many thread-like parts, some of which have little yellow heads."

What shape is the rose? — "Rose-shaped."

Those who have pictures of flowers shaped like a rose may stand.

Why do you say these flowers are shaped like a rose, or rose-shaped? — "Because they have a short, green cup, and five flower-leaves, like the rose."

Name some flowers that are rose-shaped.

THE LILY.

What is this? — "A lily (or the picture of a lily)."

What kind of a green cup has the lily? "It has no green cup."

How many flower-leaves has the lily? "Six."

How many thread-like parts has the lily? "Seven."

What do you notice about the thread-like parts of the lily? — "The thread-like parts are very long; six of the thread-like parts have long, brown heads."

What do you think the lily is shaped somewhat like? — "It is shaped somewhat like a bell."

Why do you think the lily looks like a bell? — "Because the flower-leaves spread out somewhat like the cup of a bell."

In what is the lily like a rose or pink? — "It has flower-leaves; it has thread-like parts."

In what is the lily different from the rose or pink? — "It has no green cup; it has not the same number of flower-leaves; it has not the same number of thread-like parts; the thread-like parts are not the same length."

What difference is there in the number of the flower-leaves? — "The rose and the pink have five flower-leaves; the lily has six flower-leaves."

What difference is there in the length of the thread-like parts? — "The thread-like parts of the lily are longer than those of the pink or the rose."

What difference is there in the number of the thread-like parts? — "The pink has ten thread-like parts with little purple heads; the rose has a great many thread-like parts with little yellow heads; but the lily has only six thread-like parts with brown heads."

What do you see in the lily (or in the flower-part of the picture of the lily)? — "I see in the lily (or in the flower-part of the picture of the lily) six flower-leaves, which spread out like a bell, and seven long, thread-like parts, six of which have long, brown heads."

What shape is the lily? — "Lily-shaped."

Why do you say it is lily-shaped? — "Because it has six flower-leaves, which spread out like a bell."

Those who have pictures of flowers shaped like a lily may stand.

Why do you say these flowers are lily-shaped? — "Because they have six flower-leaves, which spread out like a bell, the same as a lily."

Name the flowers which are lily-shaped.

SPECIAL LESSON II.

USES OF PLANTS.

In Manufactures.	*To make Beverages.*	*Medicines.*	*Spices.*	*For Coloring.*
The down of the cotton plant.	The leaves of the tea plant.	The root of the rhubarb plant.	The berries of the allspice tree.	The stalk and leaves of the indigo plant.
The stem of the hemp plant.	The seeds of the coffee plant.	The leaves of the senna plant.	The root of the ginger plant.	The flowers and seeds of the saffron plant.
The stem of the flax plant.	The seeds of the chocolate tree.	The root of the ipecac plant.	The bark of the cinnamon tree.	The branches and trunk of the logwood tree.
The silk-worm feeds on mulberry leaves.		The seeds of the castor-oil plant.	The seeds of the nutmeg tree.	The root of the madder plant.
		The juice of the poppy plant.	The buds of the clove plant.	
		The root of the sarsaparilla.		

EXAMPLE FORMULAS.

We use the down of the cotton plant to make spool-cotton and cotton goods.

We use the leaves of the tea plant to make the beverage called *tea*.

We use the root of the rhubarb plant for medicine.

We use the berries of the allspice tree for spicing.

We use the stalk and leaves of the indigo plant for coloring.

SPECIAL LESSON III.

PARTS OF PLANTS USED FOR FOOD.

Root.	*Stalk.*	*Leaves.*	*Seeds.*		*Fruit.*		
Radish plant.	Celery plant.	Spinach plant.	Bean vine.	Pea-nut vine.	Apple tree.	Grape vine.	Blackberry bush.
Carrot.	Rhubarb, or	Cabbage plant.	Pea vine.	Buckwheat.	Plum tree.	Pumpkin vine.	Raspberry bush.
Turnip.	pie-plant.	Tea plant.	Wheat.	Butter-nut tree.	Pear tree.	Squash vine.	Huckleberry bush.
Beet.	Asparagus.	Sage plant.	Rye.	Pecan-nut tree.	Peach tree.	Cucumber vine.	Currant bush.
Potato.	Leeks.	Marjoram.	Oats.	Pepper plant.	Quince tree.	Muskmelon vine.	Gooseberry bush.
Parsnip.	Sago.	Thyme.	Corn.	Mustard plant.	Apricot tree.	Watermelon vine.	Mulberry bush.
Onions.		Parsley.	Barley.	Nasturtium vine.	Cherry tree.	Strawberry vine.	Cranberry bush.
Horse-radish.	*Sap.*	Water-cress.	Chestnut tree.	Rice plant.	Orange tree.	Citron tree.	Barberry bush.
Tapioca.	Sugar-cane.	Lettuce.	Hickory tree.	Hazel-nut tree.	Lemon tree.	Crab-apple tree.	Tamarind tree.
Arrow-root.	Maple-sugar	Mint.	Walnut tree.	Beech-nut tree.	Banana tree.	Palm tree (dates).	Tomato vine.
Ginger plant.	tree.	Savory.	Almond tree.	Maize.	Fig tree.	Pineapple.	Pumpkin vine.

EXAMPLE FORMULAS.

We eat the root of the radish plant.
We eat the stalk of the celery plant.
We eat the leaves of the spinach plant.
We eat the seeds of the bean vine.
We eat the fruit of the apple tree.

SPECIAL LESSON II.

USES OF PLANTS.

Apparatus. — Natural specimens of the parts of various plants used for *spices*, *medicines*, *beverages*, etc.; also Willson's and Calkin's Chart XXII., "Economical Uses of Plants." A home-made chart may be prepared by using pictures taken from the labels of canned fruits, etc.; from newspapers, and gardeners' catalogues.

Method of Teaching. — The headings are obtained by familiar conversation concerning what is used in cookery to give cakes or puddings a pleasant taste, what is used to make sick people well, etc. The meanings of the words *spices*, *medicines*, etc., are given by the children in their own language, which is changed when necessary to make it correspond with the definitions we wish them to memorize.

The word *beverages* is given for the pleasant drinks named by the class; when alcoholic liquors are named, we take occasion to speak words of warning against these terrible foes to human happiness for time and eternity, and to express our thankfulness that in very early childhood a kindly hand guided ours as we wrote our name, pledging ourselves "to taste not, touch not, handle not," the cup which intoxicates.

What do people sometimes do with dresses which are faded, but not worn out, when they wish to wear them a longer time? — "Take them to the dyer's to be dyed." What do you mean by *dyed?* — "Made another color." From this reply we can proceed to the words *colored* and *coloring*, synonymous with *dyed* and *dyeing*, then to talk about some plants which are used for coloring purposes.

Calico, muslin, ribbons, or other fabrics, suggest *manufactures*, and the word *manufactory*, familiar to many of the class as the place where something is made, as chairs, pianos, candy, etc.; then we show specimens of the flax and cotton plants, and explain to those not familiar with the fabric lesson that

these are used in the manufacture of cotton and linen goods, that rope is manufactured from hemp, and silk from the thread spun by the silkworm in making its cocoon.

When the specimens and pictures of the various articles named in the outline have been shown, and the needful explanations made, the pupils give a statement concerning each, indicating its use, as, "We use the leaves of the tea-plant to make the beverage called tea," "We use the berries of the allspice tree for spice," etc.

Method of Recitation. — The usual method for Blackboard Exercises.

SPECIAL LESSON III.

PARTS OF PLANTS USED FOR FOOD.

Apparatus. — Natural specimens of *roots*, *leaves*, *fruit*, etc., used for food; also Willson's and Calkin's Chart XXI., "Economical Uses of Plants."

Method of Teaching. — The children name "the parts of a plant" from knowledge gained in Flower Lesson I.

The heading Fruits is underlined; the children name the fruits they eat, and tell whether these grow on a tree, vine, or bush. Finally they give the statement concerning each fruit named in the formula; thus: "We eat the fruit of the ——." So on for the other parts used for food.

Method for Recitation. — The usual method for Blackboard Exercises.

SPECIAL LESSON IV.

A PLANT OR TREE.

Names of Parts.	*Description of Parts.*	*Position of Parts.*	*Use of Parts.*
Root.	The part which holds the plant in its place.	At the lowest part of the plant.	Holds the plant in its place, and draws juices from the ground to nourish it.
Stalk or trunk.	The part above the root.	Above the root.	Supports the branches.
Bud.	The beginning of the leaf or flower.	On the branches, boughs, and twigs.	Begins the leaf or flower.
Leaf.	The part which shoots from the stem or branches.	On the branches, boughs, and twigs.	Lungs for the plant; absorbs moisture, as dew or rain.
Flower or blossom.	The flower-bud when it is fully open.	On the branches, boughs, and twigs.	For beauty and fragrance.
Flower (proper).	The parts which make the seed (*i.e.*, stamens and pistils).	On the branches, boughs, and twigs.	To make seeds.
Fruit.	The parts which contain the seeds.	On the branches, boughs, and twigs.	To hold, nourish, and protect the seeds.
Seeds.	The parts which produce new plants.	In or on the fruit.	To produce new plants.
Sap.	The juice of the plant.	All through the plant or tree.	To nourish the plant; to make it grow, and keep it alive.

A PLANT OR TREE.

Apparatus. — An entire plant in blossom, or the picture thereof.

Method of Teaching. — The children who have studied Lesson I. are ready to name the *parts of a plant.*

We write the second heading, and explain the word *description.* The children describe each part of a plant as well as they are able; then we assist them, until finally they give the definitions we have prepared for them.

The *position* and *use of parts* are developed in like manner.

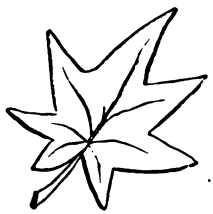
Method of Recitation. — The usual method for Blackboard Exercises.

1.

2.

3.

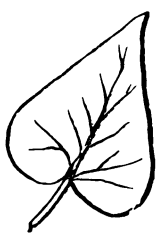
4.



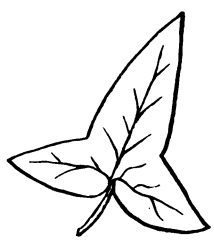
5.

6.

7.



8.



9.

10.

11.

12.

1. Round-lobed.
2. Sharp-lobed.
3. Lyre-shaped.
4. Deeply-cut.
5. Hand-shaped.
6. Bird's-foot shaped.
7. Wedge-shaped.
8. Heart-shaped.
9. Spear-shaped.
10. Arrow-shaped.
11. Awl-shaped.
12. Lance-shaped.

LEAVES.

BLACKBOARD OUTLINE.

Where grow.	***Color.***		***Parts.***	***Duration.***
On branches.	Green.	*In Autumn:* —	Stem.	From spring till fall.
On twigs.	Red.	Red; red and yellow.	Blade { Base.	For one flower season.
From roots.	Green and white.	Yellow; green and yellow.	Apex.	For many years.
	Red and white.	Brown.	Margin.	
			Surface.	

Use.		***Shape, etc.***			
For beauty.	Food for quadrupeds.	Heart-shaped.	Arrow-shaped.	Bird's-foot shaped.	Sharp-lobed.
For fragrance.	Food for birds.	Hand-shaped.	Sword-shaped.	Needle-shaped.	Round-lobed.
Shade for the flower and fruit.	Food for reptiles.	Kidney-shaped.	Shield-shaped.	Wedge-shaped.	Bundled or bunched.
	Food for insects.	Ear-shaped.	Spear-shaped.	Lyre-shaped.	Perforated.
Shade for us.	For medicines.	Egg-shaped.	Lance-shaped.	Orbicular (Circular).	Whorled.
Lungs for the plant.	For beverage.	Oval.	Oblong.	Deeply cut.	Feather-shaped.
Food for us.					

QUESTIONS FOR BLACKBOARD OUTLINE.

1. Where do leaves grow?
2. What color are leaves?
3. What are the parts of a leaf?
4. What do you mean by duration?
5. Tell about the duration of leaves.
6. Of what use are leaves?
7. Of what other uses are leaves?
8. Of what shape are leaves?

ANSWER FORMULAS.

1. Some grow on branches.
2. Some are green. In autumn some are red.
3. A leaf has a blade.
4. Length of time.
5. Some leaves last for one flower season.
6. They are for beauty.
7. Some are food for us.
8. Some are heart-shaped.

Apparatus. — Specimens of fresh and pressed leaves; small pictures representing *shapes of leaves;* needles, perforated cardboard, a bird's claw, and other objects named below, as many as may be obtainable.

Method of Teaching. — Answers to the first questions are easily obtained. Natural leaves are used in teaching *color*. In studying *parts* the children recognize the stem. The term *blade* is illustrated with the blade of a knife; *base*, *apex*, and *surface* are obtained from their knowledge of these terms in the Lessons on Form; *margin*, a new word to the class, is taught as a name given to the edge of anything.

From their own observation they are generally able to tell how long leaves last; we give them the word *duration*, and teach its signification. When questioned as to the *use of leaves*, they tell us that leaves afford pleasure because of their beauty and fragrance; and shade, not only for people, but for flowers and fruit. Reference to the vegetables used for dinner, as spinach, lettuce, etc., leads the little folks to notice that "some leaves are food for us"; they also tell that grass and other kinds of leaves "are food for animals." Tea leaves suggest the use of "some for beverages"; and senna and mint, that "some are for medicine." In the lessons on The Human Body they have learned the use of the lungs, and understand what is meant when taught that leaves act as lungs to the plant, which takes in the air through the thousands of pores in each leaf; they also learn that the thirsty plant drinks in moisture through its leaves.

In teaching the "Shapes of Leaves," we use the pictures and natural specimens. The children name the simplest shapes, as *heart-shaped*, *egg-shaped*, *oval*, and *oblong; arrow*, *sword*, *shield*, *spear*, and *lance-shaped* leaves are taught by reference to the instruments of warfare from which they are named; *hand-shaped*, by comparing leaves of this kind with the hand when its fingers are outspread; *needle-shaped*, with pine leaves and a needle, or by asking what article in a lady's work-basket leaves of this shape resemble; *bundled*, or *bunched*, with a

bundle of sticks or a bunch of flowers; *deeply-cut*, by cutting a piece of paper with scissors to imitate leaves of this kind. *Perforated leaves* are shown by specimens, or by passing a needle or pencil through a piece of paper. The term *perforated* is generally familiar to the children who make book-marks and fancy articles from perforated card-board. *Whorled* is illustrated by natural leaves, or with paper leaves arranged around a pencil or stick; *kidney-shaped*, with a geranium leaf of this shape, and by reference to the kidneys which are sold at the butcher's; *ear-shaped*, from the lobe of the ear; *bird's-foot shaped*, by comparison with the claw of a fowl or bird, whichever may be most easily obtained for the purpose; *wedge-shaped*, with a wedge of wood and an explanation of its use, and leading the children to notice that the leaf resembles the end of a wedge; *lyre-shaped*, by asking what musical instrument these leaves resemble; the reply, "A fiddle," suggests fiddle-shaped. We tell them of the lyre, and thus obtain the desired word. The word *orb* is explained, and its derivative, *orbicular*, as synonymous with *circular*, applied to leaves which are nearly round. *Feather-shaped* is taught by dividing the vanes of a feather on each side of its shaft to imitate leaflets placed on each side of the petiole in feather-shaped leaves (see Compound Leaves). *Lobed* is explained, and used to describe leaves deeply divided on the edges. The children give the terms *round-lobed* and *sharp-lobed* to designate some of the differences in lobed leaves. We also lead them to notice that *hand-shaped*, *bird's-foot shaped*, and *lyre-shaped* leaves are *lobed* leaves. After several review lessons the children become quite familiar with the twenty-four shapes of leaves seen in their pictures, and most common in gardens, fields, and woods.

Method of Recitation. — The usual method for Blackboard Exercises.

BLACKBOARD OUTLINE.

LEAVES.

Broadest.

Lobed.	*At the Apex.*	*At the Base.*	*In the Middle.*	***Other Kinds.***
1. Round-lobed.	7. Wedge-shaped.	8. Heart-shaped.	14. Kidney-shaped.	19. Shield-shaped.
2. Sharp-lobed.	3. Lyre-shaped.	9. Spear-shaped.	15. Egg-shaped.	20. Perforated.
3. Lyre-shaped.		10. Arrow-shaped.	16. Oblong.	21. Whorled.
4. Deeply-cut.		11. Awl-shaped.	17. Oval.	23. Needle-shaped.
5. Hand-shaped.		12. Lance-shaped.	18. Orbicular.	24. Bundled.
6. Bird's-foot shaped.		22. Sword-shaped.		
		13. Ear-shaped.		

QUESTIONS AND ANSWERS.

What have you learned about leaves from your picture?

"I have learned that —

some leaves grow around the stem in a circle, as *whorled leaves;*
some leaves grow in bunches, as *bundled leaves, needle-shaped leaves;*
some leaves seem to be cut, as *deeply-cut leaves;*
some leaves seem to have the stem passing through them, as *perforated leaves;*
some leaves look something like a feather, as *feather-shaped leaves;*
some leaves are deeply divided on the edge, as *lobed leaves;*
some leaves are *broadest at the apex;*
some leaves are *broadest at the base;*
some leaves are *broadest in the middle.*

Apparatus.— Large leaf-pictures to teach "Parts of Leaves"; small leaf-pictures, one for each child; specimens of natural leaves, as many as can be obtained.

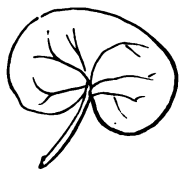
Method of Teaching. — The first part of the lesson is a review of the section "Shapes of Leaves" in the previous lesson, in which the children give the statements found in the answers to the question, "What have you learned about leaves from your pictures?"

By comparing the different pictures, the pupils discover that some leaves are broadest at the apex, some at the base, and others in the middle; they classify them according to these facts, as shown in the Outline.

Review Recitation. — The teacher asks the question given below, and, after receiving the various answers from different pupils, writes *lobed* on the blackboard, which is read by the class. The word is underlined, and those who have *lobed leaves* stand and name them. Leaves *broadest at the apex*, *at the base*, and *in the middle* are named in like manner; and, lastly, *other kinds*, as given in the Blackboard Outline.

In the closing exercise, the teacher asks the children to name the shape of the leaves in their pictures. The first pupil addressed replies by saying, "The leaf in my picture is —— shaped." The second and remaining pupils answer in the formula, "Mine is —— shaped."

13.

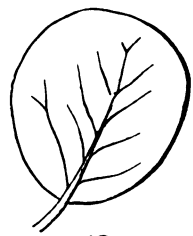


14.

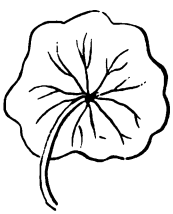
15.

16.

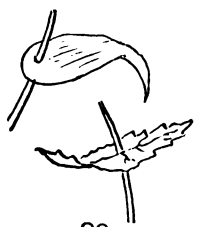
17.



18.



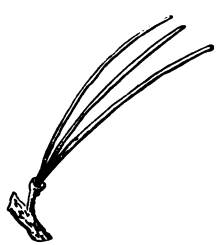
19.



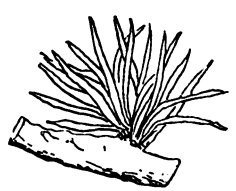
20.

21.

22.



23.



24.

13. Ear-shaped.
14. Kidney-shaped.
15. Egg-shaped.
16. Oblong.
17. Oval.
18. Orbicular.
19. Shield-shaped.
20. Perforated leaves.
21. Whorled leaves.
22. Straddling leaves.
23. Needle-shaped.
24. Bundled.

BLACKBOARD OUTLINE.

LEAVES.

1. *Parts.*

- Blade.
- Petiole.
- Stipules.

2. *The Blade.*

- Base.
- Apex.
- Margin.
- Venation { Veins. / Veinlets. / Midvein.

3. *Venation.*

- Net-veined { Feather-veined. / Palmate-veined.
- Parallel-veined.
- Forked-veined.

4. *Vernation.*

- Flat.
- Rolled { from the apex to the base. / from one side. / from each side inward } toward the midvein. / from each side outward }
- Folded { in half along the midvein. / like a fan.
- Overlapped.

5. *Arrangement.*

- Opposite.
- Alternate.
- Circular or Whorled.
- Tufted.
- Scattered.

6. *Shapes of Bases.*

- Tapering.
- Sharp.
- Blunt.
- Oblique.
- Kidney-shaped.
- Heart-shaped.
- Ear-shaped.
- Arrow-shaped.
- Spear-shaped.

7. *Shapes of Apexes.*

- Tapering.
- Sharp.
- Blunt.
- Cut-off.
- Notched.
- Heart-shaped.
- Abruptly-pointed.
- Stiff-pointed.

8. *Shapes of Margins.*

- Plain or even.
- Wavy.
- Toothed { finely. / coarsely. / equally. / unequally. / doubly.
- Saw-toothed { finely. / coarsely. / equally. / unequally. / doubly.
- Scolloped { finely. / coarsely. / equally, etc.

9. *Kinds of Surfaces.*

- Smooth.
- Rough.
- Wrinkled.
- Hairy.
- Woolly.
- Glossy.
- Silky.
- Bristly.

10. *Kinds of Leaves.*

- Simple.
- Compound. { Fingered { three-fingered. / five-fingered. / seven-fingered. / many-fingered. / Feathered { equally. / unequally. / Twice-feathered. / Thrice-feathered.

DEFINITIONS.

Blade: The flattened, green part of the leaf.
Petiole: The leaf-stem.
Stipules: Leaf-like parts at the base of the petiole.
Base: The stem end of the leaf.
Apex: The top end of the leaf, opposite the base.
Margin: The edge of the leaf.
Surfaces: The outside parts of the leaf.
Venation: The way in which the veins are arranged in the leaf.
Veins: Little pipes in the leaf for the sap to pass through; the skeleton (or framework) of the leaf.
Veinlets: Little veins.
Midvein: The vein which passes through the leaf from the base to the apex.
Net-veined: In which the veins cross each other like the threads of a net.
Parallel-veined: In which the veins do not cross each other, but are parallel.
Fork-veined: In which the veins do not cross each other, but are forked.
Vernation: The way in which the leaf is arranged in the bud.
Arrangement: The way in which leaves are placed on the stem.

KINDS OF MARGINS.

1. Toothed. 3. Wavy. 5. Saw-toothed.
2. Scolloped. 4. Plain. 6. Toothed.
7. Doubly saw-toothed.

ADVANCED LESSON.

LEAVES.

Apparatus. — Specimens of real leaves of various kinds, one for each pupil, if possible; large leaf-pictures; small leaf-pictures, to illustrate the twenty-four shapes learned in previous lessons; brown paper models of *apexes*, *bases*, *margins*, and *kinds* distributed among the children.

Method of Teaching. — 1. Parts, taught with blackboard illustrations and natural specimens.

2. The terms, *veins and venation*, obtained after talking about the veins of the hand.

3. The *kinds of venation*, illustrated with skeleton-leaves and the large pictures; also with blackboard illustrations.

4. *Vernation*, explained and shown with young leaves and blackboard illustrations; also with the paper models cut for this purpose.

5. *Arrangement of leaves*, illustrated with natural specimens and on the blackboard. The children give the descriptive terms with which they are familiar; the remainder are taught them.

6. *Shapes of bases*, *apexes*, *and margins*, taught with natural specimens, pictures, and blackboard diagrams, and the paper models. The children give as many of the descriptive terms as they can; the rest are taught them.

7. *Kinds of surface*, illustrated with natural specimens. Descriptive terms obtained as usual.

8. *Kinds of leaves* are easily taught with natural specimens, pictures, blackboard diagrams, and paper models.

Experience has proved to us that this advanced lesson on leaves, though seemingly difficult, may be made very interesting and profitable to the children, and is thoroughly within their comprehension.

Method of Recitation. — The teacher asks for the names of the *parts* of a leaf, and writes these under the first heading. As she points to each word, a child points to the part on the large picture or on the blackboard diagram of a leaf; another child defines the part mentioned. The same plan is pursued for *parts of the blade* and *venation*.

Vernation is illustrated by the children with brown paper leaf-models, in a "teacher and scholar exercise," as follows: After defining *vernation*, a child says to its next neighbor, "Show me some kind of vernation." The one addressed lays her leaf-model flat upon her hand, saying, "Some leaves lie flat in the bud"; then turns to the next child and says, "Show me another kind of vernation." Number three shows another kind, and asks number four for a third; thus the lesson proceeds, until the various kinds have been exhibited.

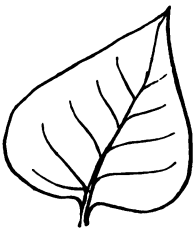
Shapes of bases. A row of children have been supplied with models of bases. Number one shows hers to number two, and asks, "What kind of a *base* is this?" Number two replies; then shows her model to number three, repeating the same question, which is answered; and number three questions number four. So on for all the kinds of bases. If any one hesitates, or fails to give the correct answer, the child-teacher motions for her to sit, and repeats the question to the next in turn.

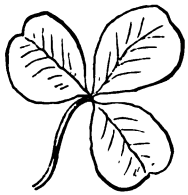
Shapes of apexes are distinguished in like manner by the children, who hold models of apexes.

Shape of margins, by those holding models of margins.

Kinds of surfaces are merely mentioned by the children, if there are no natural specimens for them to distinguish.

Compound leaves are shown by the pupils who have models of these. Sometimes a special lesson is given on "Kinds of Leaves" (see Special Lesson VII.).





SIMPLE AND COMPOUND LEAVES.

Apparatus. — The same as in the preceding lessons on leaves.

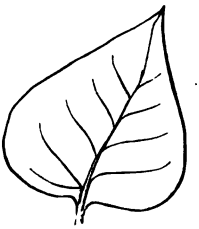
Method of Teaching. — This can easily be inferred from the questions and answers in the Review Lesson. The children are led to notice that some leaves have only one piece, or blade, and others have more than one. If they know about simple and compound words, they easily understand *simple* and *compound* when applied to leaves; otherwise, we explain and teach these terms. All through the lesson *the class assists* in making the definitions to be memorized. *Definitions should never be taught by rote.* For *leaflet*, we show how the word is made from leaf, explain the meaning of the suffix, and give a few words in which it is used, as brooklet, rivulet, ringlet, circlet, etc. After this exercise the children never forget that *leaflet* means *a little leaf.* In learning about the *fingered leaves*, the pupils spread out the fingers of the right hand, and, comparing them with the leaves, notice that the leaflets of these leaves spread from the petiole, as the fingers from the palm of the hand. From specimens they learn that a leaf may be two, three, five, seven, or many fingered.

Feathered leaves are easily taught, because the children are already familiar with their appearance, and know them as feather-shaped leaves. We show them a feather; they notice the resemblance of the "made long" or lengthened petiole to its shaft, and the position of the leaflets to that of the down upon the shaft. *Equally* and *unequally feathered* are taught from specimens illustrating these varieties.

In teaching about *twice-feathered leaves*, we let the children notice the branches of the petioles to which the leaflets are attached, in the natural specimen or the blackboard diagram. Next we give them the name *petiolule*, and show how this word is formed from *petiole*. They soon learn that *petiolules* means *little petioles*, or leaf-stems. They notice the position of the leaflets on each side of the petiolules, and learn that *compound leaves* of this kind are said to be *twice-feathered*.

Method of Recitation. — A child holds a simple leaf, or the model of one, before the class, and asks the questions of I.; the children reply in concert or individually, as the teacher may direct. A second child asks the questions of II., and other pupils those of the remaining section, receiving from the class the appropriate answers.

Pictures or paper models illustrating shapes of leaves are put into envelopes; a child takes one of these envelopes and questions the class concerning the shape and name of each of the leaves represented. The same plan is pursued with the contents of the other envelopes.



I. A SIMPLE LEAF.

1. Name the parts of the leaf as I touch them. — "The blade; the petiole."

2. How many blades has this leaf? — "One."

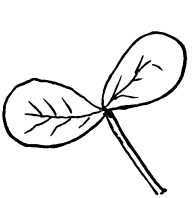
3. Then what will you call it? — "A simple leaf."

4. Why do you call it a simple leaf? — "Because it has only one blade."

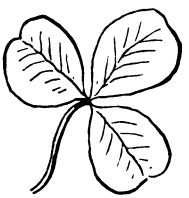
5. Then what is a simple leaf? — "A leaf which has only one blade."

II. COMPOUND LEAVES.

1. How many blades has this leaf?
2. Then what do you call it? — "A compound leaf."
3. Why do you call it a compound leaf? — "Because it has more than one blade."
4. Then what is a compound leaf? — "A leaf which has more than one blade."
5. What do you call the blades of a compound leaf? — "Leaflets."
6. What is a leaflet? — "A little leaf."



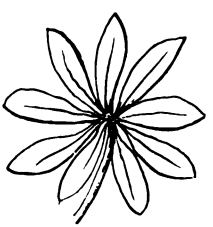
1.



2.

3.

4.



5.

III. FINGERED LEAVES.

What kind of a compound leaf is this? (See 2.) — "Fingered."

Why do you say it is fingered? — "Because the leaflets spread from the petiole like fingers from the palm of the hand."

Name some kinds of fingered leaves. — "Two-fingered, three-fingered, five-fingered, seven-fingered, many-fingered."

1.

2.

IV. FEATHERED LEAVES.

What kind of a compound leaf is this? (See 1.) — "Feather-shaped."

Why do you call it feather-shaped? — "Because the leaflets are placed on each side of the lengthened petiole, as the down of a feather is upon each side of the shaft."

What kind of a feathered leaf is this? — "Equally-feathered."

Why do you say it is equally-feathered? (See 2.) — "Because it ends with two leaflets."

What kind of a feathered leaf is this? (See 1.) — "Unequally-feathered."

Why do you say it is unequally-feathered? — "Because it ends with only one leaflet."

V. A TWICE-FEATHERED LEAF.

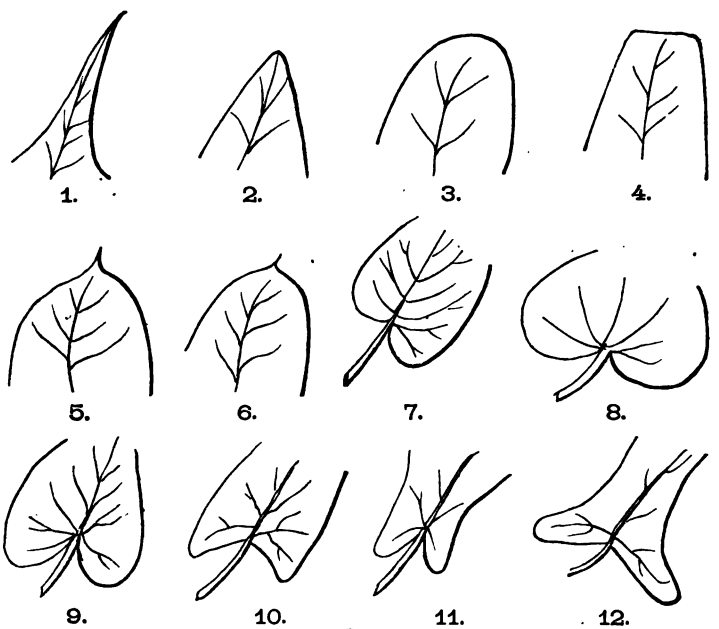
What kind of a compound leaf is this? — "Twice-feathered."

Why do you say it is twice-feathered? — "Because the leaflets are placed upon each side of the petiolules."

Suggestions.

Let the children learn to draw the various kinds of leaves from natural specimens, beginning with the simple forms. Encourage them to cut some of the shapes out of paper; also to make a collection of pressed leaves, which may be fastened upon pieces of brown or white paper of equal sizes, so as to make leaf-books. From six to ten specimens will be sufficient for one book. The name of the leaf is enough for the younger pupils to print or write at first; those more advanced may write the description of the leaves, as to shape, etc., under the direction of the teacher, for several specimens; afterward without assistance, in the preparation of Review Lessons.

For schedules of description, see Miss Youman's "First and Second Books of Botany." For a general schedule the Outline Descriptions on the next page will be useful.



BASES AND APEXES.

1. Tapering apex.
2. Sharp apex.
3. Blunt apex.
4. Cut-off apex.
5. Abruptly-pointed.
6. Stiff-pointed.
7. Slanting base.
8. Kidney-shaped.
9. Heart-shaped.
10. Arrow-shaped.
11. Ear-shaped.
12. Spear-shaped.

EXAMPLES FOR OUTLINE DESCRIPTIONS OF SIMPLE LEAVES.

Name of Leaf.	*Petiole.*	*Blade.*	*Stipules.*	*Vernation.*	*Margin.*
Lilac.	Long.	Simple.	None.	Feather-veined.	Plain.
Elm.	Short.	"	Small, falling early.	"	Doubly-toothed.
Peach.	Short.	"	None.	"	Saw-toothed.
Oleander.	None.	"	None.	"	Plain.
Holly.	None.	"	None.	"	Wavy, spine-toothed.
Quince.	Short.	"	Free.	"	Plain.
Weeping willow.	Short.	"	Free, falling early.	"	Finely-toothed.
Tulip tree.	Long.	"	Free.	"	Two-lobed.
Scarlet geranium.	Long.	"	None.	Palmate-veined.	Doubly-scolloped.
Grape.	Long.	"	None.	"	Lobed, coarsely-toothed.
English ivy.	Long, flexible.	"	None.	"	Five-lobed.
Radish.	Short.	"	None.	"	Lobed, toothed.
Grass.	None. *Sheath.*	"	Ligule.	Parallel-veined.	Plain.
Yellow lily.	None. Leaves overlapping.	"	None.	Parallel-veined.	Plain.
Rose leaflets.	Petiolule very short.	"	None.	Feather-veined.	Saw-toothed.

Name of Leaf.	*Apex.*	*Base.*	*Surface.*	*Shape.*	*Color.*
Lilac.	Sharp.	Heart-shaped.	Smooth.	Heart-shaped.	Green.
Elm.	Tapering.	Slanting.	Rough.	Egg-shaped.	Green.
Peach.	Tapering.	Round.	Smooth.	Lance-shaped.	Green.
Oleander.	Tapering.	Tapering.	Glossy, leathery.	Line-lance shaped.	Green.
Holly.	Spine-pointed.	Sharp.	Glossy, leathery.	Oval.	Dark green.
Quince.	Sharp.	Sharp.	Smooth.	Oval.	Green.
Weeping willow.	Sharp.	Sharp.	Smooth.	Narrow-lance shaped.	Green.
Tulip tree.	Cut-off.	Heart-shaped.	Smooth.	Lobed.	Dark green.
Scarlet geranium.	Round.	Kidney-shaped.	Hairy, sticky.	Kidney-shaped.	Dark green.
Grape.	Sharp.	Heart-shaped.	Woolly.	Lobed.	Dark green.
English ivy.	Sharp.	Heart-shaped.	Smooth, leathery.	Lobed.	Dark green.
Radish.	Large, round.	Tapering.	Rough.	Lyre-shaped.	Green.
Grass.	Sharp.	Sheathed.	Smooth.	Line or sword-shaped.	Green.
Yellow lily.	Sharp.	Overlapping.	Smooth.	Sword-shaped.	Green.
Rose leaflets.	Sharp.	Round.	Smooth.	Egg-shaped.	Green.

EXAMPLES FOR OUTLINE DESCRIPTIONS OF COMPOUND LEAVES.

Name of Leaf.	*Kinds.*	*Stipules.*	*Rachis.*	*Petiolules.*	*Number of Leaflets.*	*For Description of Leaflets.*
Rose.	Unequally-feathered.	United to Rachis.	Long.	Very short.	Three to seven.	Use the headings given above.
Ailanthus.	Unequally-feathered.	None.	Long.	None.	Twenty-one to forty-one.	See "Rose leaflets."
Wistaria.	Unequally-feathered.	None.	Long.	Very short.	Eleven.	
Clover.	Three-fingered.	None.	None.	None.	Three.	
American ivy.	Five-fingered.	None.	None.	None.	Five.	
Horse-chestnut.	Seven-fingered.	None.	None.	None.	Seven.	

SPECIAL LESSON V.

PARTS OF PLANTS OR TREES.

Name.	*Part.*	*Color.*	*Shape.*	*Qualities.*	*Use.*
Radish.	Root.	Red.	Spindle-shaped.	Pungent.	Food.
Oak.	Trunk, or branch.	White.	Cylinder-shaped.	Tough.	Fuel, furniture, and building.
Rosebud.	Bud.	Green.	Cone-shaped.	Fragrant.	To begin a rose.
Grass.	Leaves.	Green.	Sword-shaped.	Smooth.	Lungs for the plant; food for animals.
Lily.	Flower.	White.	Lily-shaped.	Fragrant.	To give us pleasure.
Bean.	Seed.	Green.	Spheroid-shaped.	Solid.	To make new plants ; food for us.
Maple syrup.	Sap.	Brown.	Liquid.	Liquid.	To nourish the tree ; food for us.

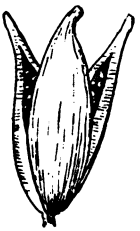
Apparatus. — Specimens illustrating the different parts of a plant or tree, one for each child.

Method of Recitation. — The various headings are written on the board. When the word *root* is underlined, those having roots rise ; each child describes that which it holds, as to color, shape, qualities, and use. So for each part, until all the specimens have been described.

Other specimens may be used instead of, or in addition to, those named in the Outline.

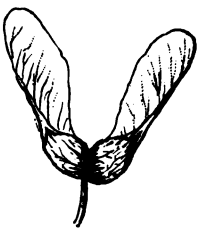
Example. — "The *radish* root is red ; it is spindle-shaped ; it is pungent ; it is used for food."

1.



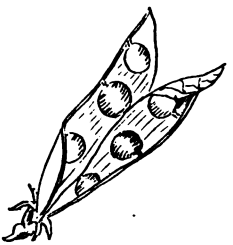
2.

3.

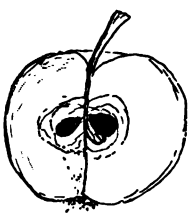


4.

5.

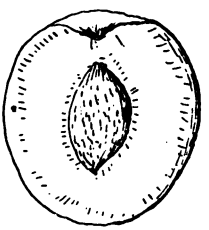


6.



7.

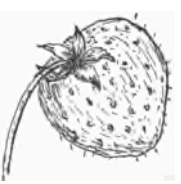
8.



9.

10.

11.



12.

1. Gourd-like.
2. Capsule-like.
3. Bag-like.
4. Winged fruit.
5. Grain-like.
6. Two-pieced pod.
7. Apple-like.
8. Berry-like.
9. Peach-like.
10. Nut.
11. Cone.
12. Strawberry.

THE FOURTEEN PRINCIPAL PARTS OF A FLOWER.

Where seen.	*Parts of a Plant.*	*Parts of a Flower.*	*Description of the Parts of a Flower.*	*Use of the Parts of a Flower.*
In gardens.	Root.	Calyx,	the outer circle of green flower-leaves.	To protect the young flower.
In parks.	Trunk, or	Sepals,	the leaves of the calyx.	For variety and beauty.
In woods.	Stalk.	Corolla,	the inner circle of colored flower-leaves.	For beauty and fragrance.
In fields.	Buds.	Petals,	the leaves of the corolla.	For variety and beauty.
In meadows.	Leaves.	Stamen,	thread-like parts next inside the corolla.	To help make the new seeds.
Among rocks.	Flowers.	Filament,	the stem-like part of the stamen.	To hold the anther.
In the water.	Fruits.	Anther,	the head of the stamen.	To hold the pollen.
On trees.	Seeds.	Pollen,	the dust or powder of the anther.	To make the new seeds.
On stones and Rocks.	Sap.	Pistil,	the central part of the flower.	To receive the pollen.
		Style,	the stem-like part of the pistil.	To hold the stigma.
		Stigma,	the head of the pistil.	To receive the pollen.
		Ovary,	the lowest part of the pistil.	To hold the seeds.
		Peduncle,	the flower-stem.	To hold the flower upon the plant.
		Receptacle,	the head of the flower-stem.	To hold the flower.

PARTS OF FLOWERS.

Apparatus. — Several kinds of simple flowers, as pinks, petunias, wild roses, or any others in which the four principal parts are prominent, a specimen for each child, if possible. When enough flowers can be obtained to supply the class, each pupil dissects its own specimen, and thus learns the parts with greater pleasure and rapidity. Large pictures of the rose, lily, and pink.

Method of Teaching. — § 1. PRINCIPAL PARTS. — *Calyx.* We lead the pupils to notice the outside part in one of the flowers, its shape and color, and then give them its name.

Corolla. Next they notice the beautiful showy part most attractive to the eye, — the crown, or corolla, — and refer to its color in different flowers. But few of them have seen green flowers, so they rightly decide that corollas are seldom green. We teach them that in books about flowers, *colored* means every color but green, including white.

Stamens. Taking off the calyx and corolla leaves the stamens exposed to view. The children notice that these resemble threads, hence may be described as thread-like parts. We give them the name *stamens.*

Pistils. The stamens are removed; the pupils see the remaining part, and observe its position, in the centre of the flower. We ask what their older brothers use on the Fourth of July, and receive the ready reply, "A pistol." This name is written on the board, and beneath it the word *pistil*, so nearly similar in sound and spelling, but so different in its meaning, "the central part of the flower." The children study calyx, corolla, stamens, and pistil until thoroughly familiar with each term.

§ 2. DEFINITIONS. — We take another flower, and let the class notice that its parts are arranged in circles about each other; then we ask how they would describe a *calyx*, accepting the successive answers: "A green circle"; "the outside circle";

"the outside circle of green"; until, finally, we obtain the description we have chosen: "The outer circle of green flower-leaves."

Corolla is easily taught when the children can define calyx.

Stamens: Their thread-like appearance, and position next inside the corolla, help to the definition as given in the lesson.

Pistil: Its position in the centre, previously noted, makes it easy for the class to describe it, as "the centre part of the flower." We give them the word *central*, and the definition is perfected.

§ 3. SECONDARY PARTS. — *Sepals and Petals* are easily taught by letting the children pick a flower to pieces and select the *leaves* of the calyx and the *leaves* of the corolla.

Parts of the Stamen. To teach the parts of the stamen, we draw a picture of a simple leaf with its stem and blade; also, a lily stamen and its parts. The children notice the stem of the latter, corresponding to that of the leaf. We ask the name of the stem of the leaf, "Petiole"; then give the name of the stem-like part of the stamen, "Filament," so-called because of its thread-like appearance in most flowers. The definition is memorized: "Filament, the stem-like part of a stamen."

The leaf has a blade at one end of its stem or petiole. From the blackboard illustration and the flowers themselves, the pupils notice that the stamen also has something at one end of its stem or filament which must have a name; this they learn is "*Anther,* the head of the stamen," because at the top or head of that part.

They have noticed the yellow dust of the lily, and are taught *Pollen*, the dust or powder of the anther.

Parts of the Pistil. When the parts of the stamens are readily recognized and defined, the outline of the pistil of a lily is drawn beside the stamen of the same flower. The parts of the pistil are then shown, and explained as carefully as were those of the stamen.

Peduncle and Receptacle. Lastly, the name of the flower-stem is taught; also that of the end upon which the flower rests.

The children memorize the definitions of the several parts, and point out these parts in various flowers, from time to time, when specimens can be obtained. They also distinguish them in the "Representative pictures of the Pink, Lily, and Rose."

From these lessons the children perceive that the flower and its parts are made on the plan of a leaf, which may be shown from the following outline: —

Part.	*Name of Stem.*	*Name of Blade.*
Leaf.	Petiole.	Blade.
Flower, or blossom.	Peduncle.	Flower.
Petal.	Claw.	Lamina, or blade.
Stamen.	Filament.	Anther.
Pistil.	Style.	Stigma.

§ 4. The Use of the Parts of the Flower. — This section is usually omitted until the children are perfectly familiar with the other portions of the lesson. As we do not expect them to know much, if anything, about the uses of the parts of a flower, the work of teaching these consists, mostly, in giving them the information which is found in the definitions they are required to memorize on this subject.

Method of Recitation. — The usual method for Blackboard Exercises.

SPECIAL LESSON VI.

COROLLAS.

Apparatus. — Pictures and specimens of the flowers named in the Outline, as many as are obtainable; one for each child.

Method of Teaching. — § 1. The children who have learned about *corollas*, *petals*, and the *shapes of flowers* are well prepared for this lesson, in which they notice, first, the number of petals in various corollas, and state what they have seen, thus: "Some flowers have only one petal in their corollas," "Some flowers have five petals in their corollas," etc.

We show them how the words *monopetalous* and *polypetalous* are formed; they learn to spell, define, and apply each to the flowers under examination.

Again: we show them a calla or its picture, and explain that the beautiful white part, so much admired, is not the corolla; that the real flowers are on the club-like part in the centre, so that the calla has no corolla, consequently no petals; that flowers which have no petals are known as "apetalous flowers." The word *apetalous* is analyzed and explained.

Compound flowers are explained by showing a dandelion, daisy, clover blossom, or sunflower, when any of these can be obtained; otherwise pictures must serve for explanation.

§ 2. The children select the monopetalous from the polypetalous corollas, then distinguish the various shapes of the former kind; afterward, those of the latter, giving the appropriate statements: "Some monopetalous corollas are bell-shaped," "some monopetalous corollas are funnel-shaped," etc.; "Some polypetalous corollas are three-petalled," "some polypetalous corollas are four-petalled," "some polypetalous corollas are butterfly-shaped," etc. For those which have no particular shape we teach the class to use the term "*anomalous*," which means irregular; hence "anomalous corollas, those which have an irregular shape."

Of polypetalous corollas, those having three petals are designated "three-petalled," and those having four petals "four-petalled," of which one kind is *cross-shaped;* those having five petals "five-petalled," some of which are *pink-shaped*, others *rose-shaped*, etc.

Lastly, the *apetalous* and *compound flowers* are selected by the class from the specimens and pictures.

Special lessons on the shapes of flowers may be given, if it is deemed best to teach the children to define these shapes with accuracy. (See p. 00; also illustrations on p. 4.)

Method of Recitation. — The usual method for Blackboard Exercises.

REVIEW LESSON ON COROLLAS.

1. What have you noticed about the number of petals in corollas?

"I have noticed that some flowers have one petal in their corollas."
" " " " three petals " "
" " " " four " " "
" " " " five " " "
" " " " six " " "
" " " " many " " "

2. What other facts have you learned about the numbers of petals in corollas?

"I have learned that some flowers have two petals in their corollas."
" " a few " seven " " "
" " some " eight " " "
" " a few " nine " " "
" " some " ten " " "
" " some " no " " "

"I have also learned that some flowers grow very closely together on the same receptacle."

3. What name is sometimes given to flowers which grow thus on the same receptacle? — "Composite flowers."

4. What name is given to corollas which have only one petal? — "Monopetalous corollas."

5. What name is given to corollas which have more than one petal? — "Polypetalous corollas."

6. What name is given to corollas which have no petal? — "Apetalous corollas."

7. Name some apetalous flowers.

8. Some composite flowers.

9. Name the monopetalous corollas you have seen or learned about.

10. Name the polypetalous corollas you have seen or learned about.

11. Name some funnel-shaped flowers, some bell-shaped, etc.

12. Name some three-petalled flowers, some four-petalled, some cross-shaped, butterfly-shaped, etc.

EXAMPLES OF OUTLINE DESCRIPTIONS.

I.

Name : Morning-glory leaf. ***Use :*** See "Use of Blade," below.

1. Parts.	*2. Position of Parts.*	*3. Color of Parts.*	*4. Shape of Parts.*	*5. Use of Parts.*
Petiole, or stem.	At the base of the blade.	Green.	Cylinder-shaped.	To hold the leaf to the branch.
Blade.	At the outer end of the petiole.	Green.	Heart-shaped.	For the plant to breathe through, and take in moisture.
Stipules.	This leaf has none.			

II.

Name : Purple Petunia. ***Use :*** For beauty and fragrance.

1.	*2.*	*3.*	*4.*	*5.*
Calyx, or cup.	On the outside of the flower.	Green.	Cup-shaped.	To hold and protect the other parts of the flower.
Corolla, or crown.	Next to the calyx.	Purple.	Funnel-shaped.	For beauty and fragrance.
Stamens.	Next to the corolla.	White, with purple heads.	Thread-like.	To help make the new seed.
Pistil.	In the centre of the flower.	Greenish white.	Thread-like.	To help make the new seed.

III.

Name : Radish root. ***Use :*** See "Use of Parts."

1.	*2.*	*3.*	*4.*	*5.*
Neck, or crown.	Next below the stem.	Red.	——	To connect the root and stem.
Main body.	Below the neck.	Red.	Spindle-shaped.	To hold the plant in its place.
Rootlets.	At the sides and end of the main body.	Whitish.	Thread-shaped.	To hold the plant in its place.
Root-tips.	At the ends of the rootlets.	Whitish.	Thread-shaped.	To draw juices from the ground.

NOTE. The same outlines will serve to describe the leaves, flowers, and roots of different kinds of plants, by varying the replies under the headings 3, 4, and 5 to suit the specimens under examination.

1.

2.

3.

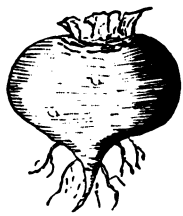
4.

5.

6.

7.

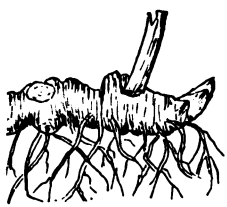
8.



9.

10.

11.



12.

1. Thread-like.
2. Bundled.
3. Branching.
4. Cone-shaped.
5. Scaly bulb.
6. Spindle-shaped.
7. Solid bulb.
8. Tubers.
9. Turnip-shaped.
10. Creeping.
11. Tuberous.
12. Rootstock.

LESSONS ON ROOTS, ETC.

Apparatus for Roots. — Radish, carrot, beet, onion, dahlia, grass, lily, daisy, etc., an entire plant, when obtainable; a specimen for each pupil; also pictures of the various shapes of roots. (See List of Roots.)

Apparatus for Stems. — Small logs and sections of the trunk or branches of common trees; stems of common plants, including lilies, wheat, and ferns, a specimen for each child; pictures of the various shapes of stems; also pictures of exogenous and endogenous stems.

Apparatus for Inflorescences. — Natural and artificial specimens of the kinds given in the "Outline Lists"; pictures of the same; chalk pictures made on the board by the teacher first, then some of the simpler kinds drawn by the pupils; paper flowers fastened on wire in the presence of the class by the teacher first, then others prepared in like manner by some of the children.

Apparatus for Fruits. — Specimens of the fruits named in the various "Lists of Fruits," one for each child; also pictures of the various shapes of fruits.

Apparatus for Buds. — Natural specimens of leaf-buds and flower-buds; budding branches; pictures of buds and branches; also leaf-forms cut from paper to illustrate "vernation" and "præfloration."

Apparatus for Seeds. — Specimens of various kinds of seeds to illustrate differences in their color, size, and shape; enough of one or more of the larger kinds for each child to hold a specimen for examination; *e.g.*, a common lima bean in which the embryo and cotyledons may be easily discerned. Interest will be added to the lesson if some of the seeds have been planted long enough to germinate and show that one part of the embryo becomes a root and the other expands into leaves.

Apparatus for Sap. — Parts of various plants, particularly those which are of the most juicy nature, as balsams, geraniums, milk-weed, etc.; fruits; specimens of substances made from sap, as jellies, gums, starch, sugar, India-rubber, etc.

Method of Teaching. — The development method as illustrated in the lessons on Leaves and Corollas. For definitions, reference may be made to the outlines given in the Explanation of Terms used in the Description of Plants, pp. 55–

Method of Recitation. — The usual method for Blackboard Exercises.

GENERAL OUTLINE.

From the "General Outline" the teacher may select the outline for the part of the flower to be studied by the children, or may use each heading as a subject upon which to examine the class. In one lesson taking Where and Kinds; in another, Parts and Color, and so on *ad libitum*.

Those not familiar with the subject of Botany, upon which these and the preceding lessons are founded, will do well to study and consult the following pages; also the standard text-books on Botany.

Name.	*Where?*	*Kinds.*	*Parts.*	*Color.*
ROOT.	In the ground. In the water. In the air. On other plants.	Primary, or Proper root. Secondary root, or Stem root.	Fibres, or root-lets. Body. Neck.	Brown. Red. White. Yellow. Orange red.
STEM, STALK, or TRUNK.	Above the root.	1. Above-ground. { Inside growers. Outside growers. 2. Under-ground. { Root-stock. Tuber. Corm. Bulb.	1. { Bark. Wood. Pith. 2. { Threads, or Fibres.	Green. Red. Brown. Spotted. Striped. Purple, etc.
BUD.	On stalks. On branches. Boughs and twigs.	Leaf-bud. Flower-bud. Leaf-and-flower bud.	Germ. Scales (sometimes).	Brown. Green.
LEAF.	On branches. On boughs. On twigs.	Seed-leaves. Lasting, or Permanent leaves.	Petiole, or leaf-stem. Stipules. Blade. Veins. Margin. Base. Apex.	Green. Green and white. Red. Red and green. Variegated. Yellow. Green and yellow. Green and purple.
FLOWER.	On stalks. On branches. Boughs and twigs.	Wild flowers. Garden flowers. Hot-house flowers or Exotics.	Cup, or calyx. Sepals. Crown, or corolla. Petals. Stamens { Filament. Anther. Pollen. Pistil { Stigma. Style. Ovary. Peduncle. Receptacle.	White. Red. Blue. Yellow. Purple. Orange. Pink. Lilac. Shaded. Variegated. Striped. Spotted, etc.

Shape.	*Habits, etc.*	*Duration.*	*Season.*	*Use.*
Branching. Conical. Spindle-shaped. Turnip-shaped. Clustered. Tuberous, etc.	Generally seek after darkness and dampness.	Some live one year. Some live two years. Some live many years.	Some from spring till winter. Some for two years. Some many years.	To hold the plant in its place. To nourish the plant. Some are — food for animals. food for man. for medicine. for dyeing, etc.
Rounded. Half-rounded. Three-sided, or triangular. Four-sided, or square. Acute-angled. Four-angled. Fluted. Jointed, etc.	Generally seek the air and the light; rise vertically; spread in every direction; climb; twine; lie flat on the ground; creep underground, etc.	One year. Two years. Many years.	Some from spring till winter. Some many years.	To carry the sap to all parts of the plant. To hold the buds, leaves, flowers, and fruit. Some are — food for us. food for animals. for medicine. for building, etc.
Round. Cone-like.	Leaf-buds generally open first.	Some from summer or fall till spring. Some only a few days, till the leaves or flowers come out.	Spring. Summer. Autumn.	To begin the flowers and leaves.
See Lessons on Leaves.	Generally fall in the autumn. Some shrink from the touch. Some act as fly-traps. Some hold water.	Some live part of the summer. Some live through the summer. Some live till autumn. Some live through the autumn. Some live many years.	Spring till winter. All the year.	Lungs for the plant. Shade for the flowers and fruit. To absorb moisture. For beauty. Some are — food for insects. food for birds. food for beasts. food for us. for medicine. for dyeing.
Lily-shaped. Rose-shaped. Cup-shaped. Bag-shaped. Tassel-shaped. Star-shaped. etc. See Lessons on Shapes of Flowers.	Some turn to the sun. Some close or go to sleep at night. Some close or go to sleep at noon, or when it is hot. Some open only in the night; go to sleep in the morning. Some open in the morning. Some open in the afternoon. Some open in the evening.	Some live only a few hours. Some live only a day. Most live only a few days.	Some bloom in the — Spring, and are small, delicate, fragrant; Summer, and are bright and fragrant; Autumn, and are showy, not often fragrant.	For beauty. Some are food for insects. Some are food for beasts. Some are food for birds. Some are for perfume. Some are for medicine. Some are for dyeing.

Name.	*Where?*	*Kinds.*	*Parts.*	*Color.*
SEED-HOLDER, or FRUIT.	On stalks. On branches, Boughs, and Twigs.	Fleshy fruits. { Berry. Gourd-fruit. Pome. Stone Fruits. Dry fruits. { Akene. Grain. Nut. Key-fruit. Pod. Cone.	Skin. Pulp. Chaff. Shell. Husks. Cells. Seeds.	Red. Orange. Yellow. Green. Bluish. Purple. Whitish. Brown, etc.
SEED.	In or on the fruit.	Albuminous. Exalbuminous.	Coats. Albumen. Embryo. Hilum. Micropyle.	Brown. Black. Yellow. Red. White.
EMBRYO.	Within the seed.	Straight. Coiled.	Radical, or root part. Cotyledons, which form the seed-leaves. Plumule, or stem-part.	White. Greenish.
SAP.	Flows from the roots, all through the plant or tree.	Ascending. Descending.	Some sap contains acid. Some contains — gum. oil. aroma. wax. resin. gum-resin. india rubber. opium. indigo. jelly. sugar. gluten.	Milk-like. Colorless. Reddish. Greenish. Yellow, etc.

Shape.	*Habits, etc.*	*Duration.*	*Season.*	*Use.*
Bag-like. Sphere-like. Ovoid. Cone-like. Spheroid-like. Chest-like (capsule). Pyramid-like. Box-like. Oblong, etc.	Some fall off when ripe. Some open when ripe.	Some last only a few days. Some last only a few months. Some may be kept many years.	Spring. Summer. Autumn. Winter.	To preserve seed. Some are — food for insects. food for birds. food for beasts. food for us. for medicine. for dyeing. for spices, etc. for beauty. for fragrance.
Kidney-shaped. Feathered. Sphere-like. Ovoid-like. Winged. Bearded. Hooked, etc.	Sown by man. Sown by animals. Sown by winds. Sown by rivers. Sown by seas. They need heat, moisture, oxygen, and darkness in order to germinate.	One year. Many years. Some live for centuries.	Ripen in spring. Ripen in summer or autumn.	To produce new plants. Some are — food for insects. food for birds. food for beasts. food for us. for medicine. for spices, etc.
Reversed. Oblique. Erect. Curved, etc.	The root part grows downward. The stem part grows upward.	Some live for centuries. One year. Many years.		Forms the new plant or tree.
Liquid.	Flows during the summer; descends and remains in the roots during the fall and winter; rises and begins to flow in the spring.	As long as the plant or tree lives.	From spring till autumn. All the year in the roots. See Habits, etc	Nourishes the plant. Makes the { stalk. buds. leaves. flowers. fruit, etc. Some — food for insects. food for birds. food for beasts. food for us. for medicine. for dyeing. for manufactures, etc.

PART II.

DEFINITIONS AND ILLUSTRATIONS

OF WORDS USED IN THE

DESCRIPTION OF PLANTS.

PARTS OF A ROOT.

Familiar Name.	*Scientific Name.*	*Description.*
Neck, crown, or life-knot.	Collum.	The parts next below the stem and leaves. (If injured, the plant will die.)
Main, or tap-root.	Caudex, or stock.	The thickened part of the root below the neck. (Some plants have no tap-root.)
Branches.	Branches.	Parts which branch from the crown or tap-root.
Rootlets.	Fibres, fibrils, radicals.	The little branches at the end of roots.
Root-tips.	Fibres, fibrils, spongioles.	The free end of the rootlets : these take in nourishment for the plant.
Root-hairs.	Root-hairs.	Hair-like parts upon the root.

KINDS OF ROOTS AS TO THEIR ORIGIN.

Primary roots . . . . . Those which grow from the root-end of the plantlet springing from the seed.
Secondary roots . . . . . Those which grow from any part of the stem ; called also adventitious roots.

EXAMPLES: The roots of lilies, oats, corn; roots from strawberry-runners, from plant-slips, and layers.

KINDS OF ROOTS AS TO THEIR SITUATION.

Terrestrial roots .	Those which are fixed in the ground.	EXAMPLES :	Grass, rose, oak.
Aquatic roots . .	Those which float upon the surface of the water.	"	Duckmeat, water-starwort.
Aerial roots . . .	1. Those sent forth from the joints of creeping plants.	"	Ground ivy, trumpet-creeper.
	2. Those sent forth erect from stems high in the air.	"	Screw-pine, common maize.
	3. Those which are fixed upon other plants, but are nourished by the air.	"	Some orchids, hanging moss.
	4. Those which feed upon the plants on which they are fixed. .	"	Mistletoe, dodder.

DEFINITIONS.

A. Fibrous roots: thread-like roots.
B. Tap-roots: a simple, conical root, with branches spreading from it.
C. Under-ground stems or branches, improperly called roots.

① Annuals: plants lasting but one year.
② Biennials: plants lasting two years, growing the first, and flowering and fruiting the second year.
♃ Perennials: plants lasting many years, flowering and fruiting every year.

SHAPES OF ROOTS.

	Familiar Name.	*Scientific Name.*	*Description.*
A.	1. Thread-like.	① Fibrous.	Shaped like threads; slender, thread-like roots, which grow in bunches from the base of the plant-stem.
A.	2. Necklace-like.	① Moniliform.	Shaped like beads or knobs strung on threads; thread-like roots, thickened in parts.
A.	3. Bundle-like.	① Fasciculated.	Shaped like a bundle of radishes; thick, long, fleshy roots, which grow in bunches from the base of the plant-stem.
B.	4. Tuberous.	♃ Tubercular.	Shaped like knobs; thick, fleshy knobs, united at the base of the plant-stem by fibres.
B.	5. Cone-shaped.	② Conical.	Shaped like a cone; a solid root, tapering from the base of the plant-stem downward.
B.	6. Bitten-off.	② Premorse.	Shaped like a cone with the apex bitten off; a solid root, tapering from the plant-stem downward to a very blunt apex.
B.	7. Spindle-shaped.	② Fusiform.	Shaped like a spindle; a solid root, tapering both ends.
B.	8. Turnip-shaped.	② Napiform.	Shaped like a turnip; a solid root, abruptly swelling toward the middle and very gradually tapering toward its lower end.
	9. Branching.	♃ Ramose.	Shaped like a tree with its branches outspread; a woody root, sending out many woody branches.
C.	10. Creeping.	♃ Repens.	A *stem*, which runs on the surface of the ground, sending down a root, and sending up stems, leaves, etc., at each of its joints.
C.	11. Rootstock.	♃ Rhizoma.	A fleshy, horizontal, more or less under-ground *stem*, having joints and branches from which shoots and roots are produced yearly.
C.	12. Knob-like.	♃ Tubers.	Fleshy knobs, which grow at the end of under-ground stems.
C.	13. Solid bulb.	♃ Corm.	A fleshy, bud-shaped *stem*, somewhat like a spheroid, having fibres at its base.
C.	14. Scaly bulb.	♃ Bulb.	An under-ground *stem*, bearing leaf scales at its top and fibres at its base.
C.	15. Coated bulb.	♃ Funicated bulb.	A *scaly* bulb, when the scales are narrow and separated like those of the lily. A *coated* bulb, when the scales are broad and surround each other like those of the onion.

SHAPES OF ROOTS. — *Continued.*

1.

Thread-like.

(*Fibrous.*)

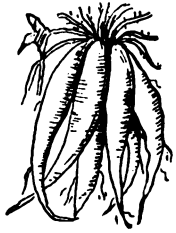
Grasses.
Grains.
Sedges.
Most annuals; as pinks, petunias, etc.

2.

Necklace-like.

(*Moniliform.*)

Oxalis, or wood-sorrel.
Toothwort.
Dentaria heterophylla.
Mourning geranium.
Dentaria maxima.



3.

Bundle-like.

(*Fasciculated.*)

Peony.
Buttercup.
Sweet-cicely.
Early crowfoot.
Asparagus.

4.

Tuberous.

(*Tubercular.*)

Sweet potato.
Dahlia.
Spring beauty.
Live-forever.
Four-o'clock.

5.

Cone-shaped.

(*Conical.*)

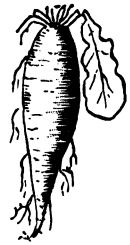
Parsnip.
Carrot.
Horse-radish.
Some beets.
Wild parsnip.

6.

Bitten-off.

(*Premorse.*)

Bird's-foot violet.
Devil's-bit.
Trillium.
Cowslip.
Plantain.

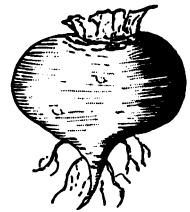


7.

Spindle-shaped.

(*Fusiform.*)

Radish.
Some beets.
Carrot.
Yellow dock.
Ginseng.



8.

Turnip-shaped.

(*Napiform.*)

Common turnip.
Ruta-baga.
Some beets.
Spanish radish.
Turnip radish.

9.

Branching.

(*Ramose.*)

Trees and shrubs, as
Apple tree.
Maple tree.
Lilac.
Rose.

10.

Creeping.

(*Repens.*)

Strawberry.
Goldthread.
English daisy.
Sarsaparilla.
Wood anemone.

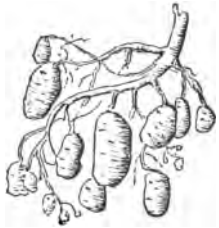
SHAPES OF ROOTS. — *Continued.*

11.

Rootstock.

(*Rhizoma.*)

Mint.
Sweet flag.
Ginger.
Solomon's seal.
Water lily.



12.

Knob-like.

(*Tubers.*)

Potato.
Jerusalem artichoke.
Nutgrass.
Wild bean.
Sweet potato.

13.

Solid Bulb.

(*Corm.*)

Indian turnip.
Crocus.
Gladiolus.
Cyclamen.
Wake robin.

14.

Bulb.

(*Bulb.*)

Lily.
Tulip.
Hyacinth.
Tuberose.
Onion.

STRUCTURE OF STEMS.

Familiar Name.	*Scientific Name.*	*Description.*
1. Inside-growing.	Endogenous.	Those which have the old portion near the surface, and the new near the centre of the stem, growing from the inside.
2. Outside-growing.	Exogenous.	Those which have the new portion near the surface, and the old near the centre of the stem, growing from the outside.
3. End-growing.	Acrogenous.	Those which grow at the point or apex only, growing from the end or summit.
4. Upward-growing.	Anophytes.	Those which grow upward, but are composed mostly of cellular substance.
5. Flat-growing.	Thallogenous.	Those which grow into a flat expansion, without leaves, stem, or flower.
	EXOGENOUS STEM.	
Pith.	Medulla.	The central part of an outside-growing stem.
Silver-grain.	Medullary rays.	Rays extending from the pith to the bark.
Wood.	Lignum.	The rings between the pith and the bark.
Bark.	Liber.	The outside rings of an outside-growing stem.
	THE WOOD.	
Heart-wood.	Duramen.	The dry, hard, old dead wood of an outside-growing stem.
Sap-wood, or white-wood.	Alburnum.	The young, fresh, new wood of an outside-growing stem, through which the sap ascends.
Zone of growth.	Cambium-layer.	The very thin layer which unites the newest wood and the newest bark.
	THE BARK.	
Inner bark.	Liber, or fibrous layer.	The inside of the bark, composed of thread-like parts or fibres.
Outer bark.	Super, or cellular layer.	The outside of the bark, composed of cell-like parts. See A and B.
A. Green bark.	Green layer.	The tender cells of the outer bark, filled with green matter, as in leaves.
B. Corky bark.	Corky layer.	The corky substance of the outer bark, outside of the green layer. (It gives color to the stems.)
Skin.	Epidermis.	The outside covering.

ENDOGENOUS STEMS

Have no separate pith, no ring of wood or bark, but the threads of wood are scattered throughout the whole stem.

EXAMPLES OF STEMS.

1. Inside-growing.
(*Endogens.*)

Grasses.	Palms.
Lily.	Tulip.
Calla.	Smilax.
Jack-in-the-pulpit.	Corn.
Hyacinth.	Rye.
Crocus.	Oats.
Sedges.	Daffodil.
Orchids.	Rush.
Lily-of-the-valley.	Onion.

2. Outside-growing.
(*Exogens.*)

Oak.	Rose.
Elm.	Lilac.
Maple.	Pink.
Sycamore.	Dahlia.
Chestnut.	Grape.
Orange.	Geranium.
Pine.	Morning-glory.
Sage.	Wistaria.
Bean.	Pond-lily.

3. Summit-growing.
(*Acrogens.*)

Ferns. Club-mosses.

4. Upward-growing.
(*Anophytes.*)

Mosses. Liverworts.

5. Flat-growing.
(*Thallogens.*)

Lichens. Sea-weeds. Fungi.

THE STEM.

Familiar Name.	*Scientific Name.*	*Description.*	
Node.	Node.	The part of a stem from which a leaf grows.	
Internode.	Internode.	The part of a stem between two nodes.	
Leaf-axil.	Leaf-axil.	The point on the upper side of the leaf where it joins the stem.	
		ATTITUDE OF STEMS.	*Examples.*
Standing.	Erect.	Standing upright.	Pine, lilac, oleander, rose.
Spreading.	Diffuse.	Spreading in all directions.	Chickweed, elm, apple.
Drooping.	Declined.	Bending over to one side.	Weeping willow.
Ascending.	Assurgent.	Rising in a slanting position.	Pigmy-weed, red clover, thyme.
Climbing.	Scandent.	Rising by clinging to other objects.	Ivy, grape, clematis, pea.
Twining.	Voluble.	Rising by winding around other objects.	Bean, hop, morning-glory.
Prostrate.	Procumbent.	Lying flat on the ground.	Pumpkin, cucumber, peanut-vine.
Trailing.	Decumbent.	Lying loosely upon the ground.	Poison ivy, thyme, pennywort.
Under-ground.	Subterranean.	Lying concealed beneath the surface of the ground, like roots.	Potato, mint, water-lily.
Creeping.	Repent.	Lying on or just below the surface of the ground, and sending down rootlets from their nodes.	Strawberry, wintergreen, white clover, cranberry.
		STEMS ABOVE-GROUND. (*Aerial Stems.*)	
Sucker.	Sucker.	A branch which *ascends* from an under-ground stem.	Raspberry, rose, lilac.
Stolon.	Stolon.	A branch which grows above-ground, *descends*, takes root, and becomes a new plant.	Currant, gooseberry.
Offshoot.	Offshoot.	A short stolon.	Houseleek.
Runner.	Runner.	A thread-like stem, which runs along the ground a short distance, then takes root and becomes a new plant.	Strawberry.
Tendril.	Tendril.	A leafless, thread-like branch, or a thread-like part of a leaf.	Grape, squash, pea.
Thorn.	Spine.	A stunted branch.	Pear, plum, honey-locust.
Scape.	Scape.	A stem which grows from the root or rootstock, and bears flowers only.	Crocus, onion, lily-of-the-valley.
Grass-stem.	Culm.	A jointed stem.	Grasses, sedges, corn, rye.
Palm-stem.	Caulex.	A scaly stem.	Palm.
Trunk.	Caulis.	The main stem of trees.	Oak, apple, peach.

For **STEMS UNDER-GROUND** (*Subterranean Stems*), see Lesson on *Roots*.

WORDS USED TO DESCRIBE STEMS.

Size.	*Color.*	*Surface.*	*Structure.*	*Duration.*
Long.	Sea-green.	Smooth (Glabrous).	Solid.	Annual.
Short.	Brown.	Rough (Rugose).	Hollow (Tubular).	
Slender.	Purple.	Hairy (Pilose).	Soft and Brittle (Herbaceous).	Biennial.
Thick.	Red.	Sticky (Viscid).		
High.	Spotted.	Shiny (Glossy).	Hard and Tough (Woody)	Perennial.
Low.	Striped, etc.	Dull, etc.		

EXAMPLES OF SHAPES OF STEMS.

1. Rounded. (*Terete* or *Cylindrical.*)	*2. Half-rounded.* (*Semi-terete.*)	*3. Angular.* (*Angular.*)	*4. Square.* (*Quadrangular.*)	*5. Furrowed.* (*Sulcate.*)	*6. Flattened.* (*Compressed.*)
Rose.	Maiden-hair fern.	Horse-radish.	Mint.	Beet.	Poplar.
Lilac.	Yellow pond-lily.	Violet.	Bean.	Yellow dock.	St. John's wort.
Pear.	White clover.	Pansy.	Coleus.	Celery.	Leek.
Morning-glory.	Celery.	Matrimony vine.	Catnip.	Amaranth.	Some cactuses.
Most trees.	Rhubarb.	Sedges.	Salvia.	Red mulberry.	Blue-eyed grass.

STRUCTURE OF STEMS.

Familiar Name.	*Scientific Name.*	*Description.*
Herb.	Herbaceous.	Having soft, not woody stems, which die down to the ground every year, or after blossoming.
Shrub-like.	Suffrutescent.	Slightly woody at the base above-ground, and living from year to year.
Half-shrubby.	Suffruticose.	A low stem, very woody at the base, and herb-like at the top.
Shrub.	Fruticose.	Woody, living year after year, and of large size. Shrubs divide into branches at or near the ground.
Tree-like.	Arborescent.	Resembling a tree in appearance and size.
Tree.	Arboreous.	Having a large main stem or trunk, which divides into branches some distance above the ground.

EXAMPLES.

Herbs. (*Herbaceous.*)	*Half-shrubby.* (*Suffruticose.*)	*Shrub.* (*Fruticose.*)	*Tree-like.* (*Arborescent.*)	*Tree.* (*Arboreous.*)	*Vines.* (*Climbing or creeping shrubs, etc.*)
Grass. Flax.	Whortleberry.	Lilac. Syringa.	Some oaks.	Apple. Pear.	Grape. Wistaria.
Balm. Pink.	Ice-plant.	Oleander.	Tree fuchsia.	Elm. Box.	Cypress. Ivy.
Oxalis.	Sweet-fern.	Snowball.	Some willows.	Maple. Palm.	Morning-glory.
Dandelion.	Wintergreen.	Spiræa. Rose.	Plum. Quince.	Pine. Oak.	Woodbine honeysuckle.
Portulacca.	Blackberry.	Rose-of-Sharon.	Some yuccas.	Catalpa.	Passion-flower.
Asparagus.	Raspberry.	Spice-shrub.	Tree cotton.	Tulip-tree.	Madeira-vine.
Pond-lily.	Gooseberry.	Hazel-nut.	Pomegranate.	Magnolia.	American ivy.
Buttercup.	Currant.	Common juniper.	Jerusalem cherry-tree.	Sassafras.	Honeysuckle.
Poppy. Radish.	Thyme. Sage.	Rhododendron.	Tree house-leek.	Chestnut.	Trumpet creeper.
Violet. Daisy.	Bittersweet.	Choke-cherry.	Century plant.	Butternut.	Climbing bittersweet.
Nasturtium.	Lavender. Rue.	Hydrangea.	Oleander.	Hickory.	Cucumber melon.
Sunflower.	Mother-of-thyme.	Dogwood. Kalmia.	Rubber tree.	Ailanthus.	Pumpkin. Bean. Pea.
Mignonette.	Horse-shoe geranium.	Tea-plant. Quince.	Some cactuses.	Horse-chestnut.	Strawberry. Smilax.

DIVISION OF PLANTS,

According to the Structure, Duration, and Height of the Stems.

1. Herbs.

Annuals spring up, flower, and bear fruit in one season. — Balsam.
Biennials spring up the first year, bear fruit and die the second. — Beet.
Perennials die down to the ground every year, but the root lives. — Pink.

2. Woody Perennials.

Trees grow more than twenty feet high. — **Oak.**
Shrubs grow from five to twenty feet high. — **Quince.**
Bushes grow from three to five feet high. — **Currant.**
Undershrubs grow less than three feet high. — **Dwarf box.**
Vines depend upon other objects for support. — **Grape.**

NOTE. { Deciduous trees lose their foliage in the winter. — Maple, etc.
{ Evergreen trees do not lose their foliage in the winter. — Pine, etc.

BUDS.

KINDS OF BUDS.

Familiar Name.	*Scientific Name.*	*Description.*
Leaf-bud.	Leaf-bud.	That which contains the young leaf; the beginning of a leaf.
Flower-bud.	Flower-bud.	That which contains the young flower; the beginning of a flower.

PARTS OF A BUD.

Outer scales and Downy substances	Hybernaculum, or Winter-case.	The tough, leathery scales on the outside which keep out the moisture. The soft, downy substance inside the case which keeps out the cold.
Young leaves or flowers.	Germ, or Embryo-leaf.	The central part containing the young leaf, flower, or branch.
Gummy substance.	Resinous substance.	The gum which covers the scales, fastening them together.

POSITION OF BUDS.

End-buds.	Terminal-bud.	The bud at the top-end of a stem. (These increase the length or height of the stem.)
Axillary-bud.	Axillary-bud.	The bud in the axil of a leaf. (These increase the number of branches.)
Underground-bud.	Subterranean-bud.	See "Bulb" in Lesson on Roots.

KINDS OF LEAF-BUD ARRANGEMENT. (*Vernation*, or *Præfoliation*.)

Familiar Name.	*Scientific Name.*	*Description.*	
Flat.	Flat.	Neither rolled nor folded.	Mistletoe.
Folded-down.	Inflexed or reclinate.	Folded from the apex toward the base.	Tulip-tree.
Folded-together.	Conduplicate.	Folded in half along the midvein.	Peach, cherry, rose, oak.
Fan-like.	Plicate or plaited.	Folded back and forth like a fan.	Maple, geranium, currant.
Overlapping or straddling.	Equitant.	Opposite leaves folded in half along the midvein and overlapping each other at the base.	Iris, sedges, grasses.
Rolled-inward.	Involute.	Rolled inward from both edges toward the midvein.	Violet, water-lily, apple.
Rolled-outward.	Revolute.	Rolled outward from both edges toward the midvein.	Azalea, dock, willow, primrose.
Half-rolled.	Obvolute.	Each leaf infolding half of the opposite leaf.	Sage.
Rolled-around.	Convolute.	Rolled spirally.	Apricot; some plums.
Crosier-like.	Circinate.	Rolled downward from the apex to the base.	Sundew, ferns.

KINDS OF FLOWER-BUD ARRANGEMENT. (*Præfloration*, or *Æstivation.*)

Familiar Name.	*Scientific Name.*	*Description.*	
Open.	Open.	Not touching, folded, or rolled.	Mignonette.
Valve-like.	Valvate.	Edges touching but not overlapping.	Lilac, grape, English ivy.
Turned-inward.	Induplicate.	Edges turned slightly inward and touching.	Clematis, buckbean, poke, potato.
Turned-outward.	Reduplicate.	Edges turned slightly outward and touching.	Hollyhock sepals.
Shingled.	Imbricate.	The parts overlapping like the shingles of a roof.	Sassafras, water-lily, magnolia.
Alternate.	Alternate.	The parts of the inner circle opposite the spaces of the outer circle of flower-leaves.	Lily, crocus, tulip, dog-tooth violet.
Five-ranked.	Quinuncial.	Five parts; two inside, two outside, and one intermediate.	Wild rose, apple, linden.
Banner-covered.	Vexillary.	The banner, or largest part, overlapping the others.	Bean, pea, locust, wistaria.
Rolled.	Convolute.	Each part rolled around its neighbor.	Geranium, syringa, oxalis, forget-me-not.
Twisted.	Contorted.	Overlapping and twisted together.	Oleander, phlox, cypress vine, flax.
Plaited.	Plicate.	Folded lengthwise like a fan.	Morning-glory, potato, thorn-apple, petunia.
Rolled and twisted.	Supervolute.	All the parts wrapped around in the same direction.	Morning-glory, thorn-apple, sweet potato.

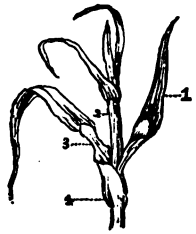
NOTES.

Buds are formed in the axils of leaves in the autumn, generally, but sometimes in the summer, for the following spring.

The spring sun melts the gummy substance, the scales open and frequently fall off, and the young leaves or flowers begin to unfold and grow. The winter-case is not found upon the buds of trees of very warm climates. Growing plants are continually putting forth leaf-buds. Flower-buds may be looked for in their appropriate season. To discover the kind of leaf or flower-bud arrangement, cut the bud across in a horizontal direction; that is, make a cross-section, and examine its flat surface, or unroll the leaves very carefully, and notice how they are placed. Each species of plant has its own kind of flower-bud arrangement, or *præfloration*, also of vernation, or *præfoliation.*

A.

LEAVES.



B.

PARTS OF A LEAF.

Familiar Name.	*Scientific Name.*	*Description.*
Blade (A. 1, B. 1).	Lamina.	The flattened green part of the leaf.
Leaf-stem, or Stalk (A. 2, B. 2).	Petiole.	The leaf-stem.
Stipule (A. 3).	Stipule.	The leaf-like part at the base of the stem.
Sheath (B. 4).	Sheath.	A leaf-stalk which surrounds the blade; as in grasses.
Ligule (B. 3).	Ligule.	A scale-like stipule between the blade and the sheath; as in Indian corn.

KINDS OF STIPULES.

Free.	Free.	Not united to any part of the stem or blade. — Quince.
Adnate.	Adnate.	United to the leaf-stem. — Rose.
Thorn-like.	Prickly.	Resembling thorns. — Locust.
Sheath-like.	Ochreate.	Forming a sheath around the stem. — Rhubarb.
Divided.	Cleft.	Very much divided on the margin. — Pansy.

PARTS OF THE BLADE.

Base.	Base.	The stem-end of the leaf.
Apex.	Apex.	The top-end of the leaf, opposite the stem-end.
Margin.	Margin.	The edge of the leaf.
Surface.	Surface.	The outside part of the leaf.
Veins, or Ribs.	Veins.	The stoutest part of the skeleton of the leaf; little pipes in the leaf through which the sap runs.
Veinlets.	Veinlets.	Branches of the veins; little veins.
Veinulets.	Veinulets.	Branches of the veinlets.
Midvein, or Midrib.	Midvein.	The vein which passes through the middle of the leaf, from the base to apex.

TERMS USED IN THE DESCRIPTION OF LEAVES.

Veining.	Venation.	The way the veins are arranged in the leaf.
Leaf-bud arrangement.	Vernation.	The way the leaf is arranged in the bud; also called *Præfoliation.*
Leaf arrangement.	Phyllotaxy.	The way leaves are arranged in the stem.

KINDS OF VENATION.

Netted-veined.	Reticulated.	In which the veins cross each other like the threads of a net. — Rose, maple.
Parallel-veined.	Parallel-veined.	In which the veins do not cross each other, but are parallel or nearly parallel. — Lily, palm.
Forked-veined.	Furcate-veined.	In which the veins do not cross each other, but spread out separately, somewhat like the prongs of a fork. — Ferns.

KINDS OF NETTED-VEINED LEAVES.

Feather-veined.	Pinnately-veined.	Those in which the veins are arranged on each side of the midvein, like the plume of a feather on each side of the shaft.
Ray-veined, or Finger-veined.	Palmately-veined, Digitately-veined, or Radiate-veined.	Those in which the veins branch off from three or more ribs, which spread like rays or fingers from the top of the leaf-stalk.

KINDS OF PARALLEL-VEINED LEAVES.

Parallel-veined.	Parallel-veined.	1. Those in which the veins all run from the base to the apex. 2. Those in which the veins run from the midvein to the margin.

POSITION OF LEAVES.

Stem-leaves.	Cauline leaves.	Leaves which grow from the stem. — Rose, lilac, oak.
Root-leaves.	Radical leaves.	Leaves which grow near the root, or from underground stem. — Crocus, tulip, [dandelion.

KINDS OF LEAVES ACCORDING TO THE ORDER OF THEIR APPEARANCE.

Seed-leaves.	Cotyledons.	Those which come up with the plant when it first appears above-ground. — Bean, pea.
First leaves.	Primordial leaves.	Those which grow next to the seed-leaves.
Proper leaves.	Characteristic leaves.	Those which are found on the mature plant. (Some plants do not have the first two kinds.)

LEAVES. — *Continued.*

ARRANGEMENT OF STEM-LEAVES.

Familiar Name.	*Scientific Name.*	*Description.*
Alternate.	Alternate.	Placed one above the other on opposite sides of the stem. — Rose, apple, bean.
Opposite.	Opposite.	Two leaves placed opposite each other at the same node. — Maple, honeysuckle, myrtle.
Irregular.	Scattered.	Placed irregularly on the stem. — Potato, orange, lily.
Whorled.	Verticillate.	More than two leaves placed around the stem at the same node. — Juniper, red lily, anemone.
Tufted.	Fascicular.	Very much crowded together at the same node. — Larch, pines, moss-pink.
Rose-like.	Rosulate.	Resembling a full-blown rose. — House-leek.
Overlapping.	Equitant.	Opposite leaves folded in half along the mid-vein, and overlapping at the base. — Iris, crocus, [gladiolus.

SPIRAL ARRANGEMENT OF ALTERNATE LEAVES (See Gray's Botany).

Two-ranked ($\frac{1}{2}$)	When the second leaf is exactly opposite the first; the third over the first; the fourth over the second, etc. — Grass, corn, lime-tree.
Three-ranked ($\frac{1}{3}$)	When the second leaf is one-third around the stem from the first; the third two-thirds around; the fourth over the first, etc. — Sedges, white hellebore.
Five-ranked ($\frac{2}{5}$)	When the sixth leaf is over the first; the seventh over the second; the eighth over the third, etc. — Poplar, apple, cherry.
Eight-ranked ($\frac{3}{8}$)	When the ninth leaf is over the first; the tenth over the second; the eleventh over the third, etc. — Holly, plantain.
Thirteen-ranked ($\frac{5}{13}$)	When the fourteenth leaf is over the first; the fifteenth over the second; the sixteenth over the third. — House-leek.

ARRANGEMENT OF OPPOSITE AND WHORLED LEAVES.

Opposite	The second pair is placed over the space between the first; the third pair over the space between the second, etc.
Whorled	The leaves of the second whorl are placed over the spaces of the first; the leaves of the third over the spaces of the second, etc.

STRUCTURE OF A LEAF.

Framework.	Skeleton.	The woody or fibrous part which forms the veins of the leaf.
Pulp.	Parenchyma.	The soft part of the leaf between the veins.
Skin.	Epidermis.	The very thin outer covering of the leaf.
Green substance.	Chlorophyll.	That which gives the green color to the leaf.
Breathing pores.	Stomata.	Very small openings through the outer skin into the air cells of the leaf.

COLOR OF LEAVES.

1. *Green.*	2. *Light Green.*	3. *Dark Green.*	4. *Sea-Green.*	5. *Green and Red.*
Rose.	Petunia.	Ivy.	Cabbage.	Riband-grass.
Grass.	Smilax.	Woodbine.	Carnation.	Silver-leaf geranium.
Grape.	German ivy.	Box.	Sycamore.	Zebra-plant.
Lilac.	Cassia.	Black spruce.	Opium poppy.	Pepormia.
Rose geranium.	Lemon-verbena.	Some cannas.	California poppy.	Euphorbia.
Wistaria.	Sweet flag.	White pine.	Celandine.	Ivy-leaf geranium.

6. *Green and Red.*	7. *Green and Yellow.*	8. *Red, etc.*	9. *Ash Color.*	10. *Autumn Leaves.*
Some coleus.	Farfugium.	Some coleus.	Glaucium.	Some are Red.
Some geraniums.	Chinese honeysuckle.	Red amaranthes.	Centaurea.	" Yellow.
Draceana.	Some coleus.	Some geraniums (g. r. y.).	Everlasting.	" Brown.
Caladium.	Euonymus (g. y. w.).	Some coleus (g. r. y.).	Chamomile.	" Green and red.
Begonia rex.	Some abutilons.	Zebra-plant (g. p.).	Cineraria, or	" Red and yellow.
Some alternanthera.	Some achyranthes.	Some achyranthes.	Dusty miller.	" Green and yellow.

KINDS OF BASES.

Familiar Name.	*Scientific Name.*	*Description.*
1. Tapering.	Acuminate.	Tapering very gradually toward the leaf-stem.
2. Slanting.	Oblique.	Having one side longer than the other.
3. Heart-shaped.	Cordate.	Resembling the base of a heart.
4. Kidney-shaped.	Reniform.	Resembling the base of a kidney.
5. Ear-shaped.	Auriculate.	Resembling the lobes of the ears.
6. Spear-shaped.	Hastate.	Resembling the handle of a spear.
7. Arrow-shaped.	Saggittate.	Resembling the top of an arrow.
8. Down-running.	Decurrent.	Having the lobes fastened down the sides of the stem; as in thistle, mullein, tobacco.
9. Stem-clasping.	Amplexicaul.	Having the lobes surrounding the stem.
10. United.	Connate.	Having the bases of two leaves united at the stem.

1.

Tapering.

(*Acuminate.*)

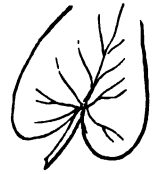
Daisy.
Willow.
Horse-chestnut.
Black willow.
Holly.

2.

Slanting.

(*Oblique.*)

Linden.
Begonia.
Begonia rex.
Slippery elm.
Elm.



3.

Heart-shaped.

(*Cordate.*)

Morning-glory.
Burdock.
Maple.
Catalpa.
Silver-leaf poplar.

4.

Kidney-shaped.

(*Reniform.*)

Scarlet geranium.
Ground ivy.
Wild ginger.
Horseshoe geranium.
Pennywort.

5.

Ear-shaped.

(*Auriculate.*)

Sage.
Ear-leaf magnolia.
Fireweed.
Sorrel.
Bittersweet.

6.

Spear-shaped.

(*Hastate.*)

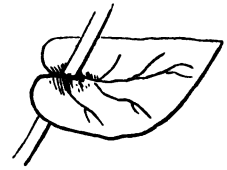
Sweet potato.
Buckwheat.
Bittersweet.
White lettuce.
Sheep sorrel.

7.

Arrow-shaped.

(*Saggittate.*)

Calla.
Bindweed.
Spinach.
Buckwheat.
Arrow-arum.

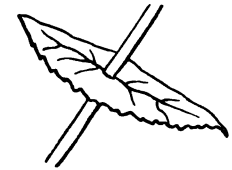


9.

Stem-clasping.

(*Amplexicaul.*)

White poppy.
Henbane.
Fireweed.
Elecampane.
Ox-eyed daisy.



10.

United.

(*Connate.*)

Boneset.
Red honeysuckle.
Yellow honeysuckle.
Cup-plant.
Fuller's teasel.

KINDS OF APEXES.

Familiar Name.	*Scientific Name.*	*Description.*
1. Sharp.	Acute.	Ending in a point.
2. Tapering.	Acuminate.	Ending in a long, tapering point.
3. Blunt.	Obtuse.	Rounded at the apex.
4. Abruptly-pointed.	Cuspidate.	Ending suddenly with a sharp point.
5. Stiff-pointed.	Mucronate.	Ending with a stiff point.
6. Slightly-notched.	Emarginate.	Slightly notched.
7. Turned-in.	Retuse.	Very slightly notched; *i.e.*, rounded inward.
8. Heart-shaped.	Obcordate.	Deeply notched, or heart-shaped at the apex.
9. Cut-off.	Truncate.	Ending abruptly, as if cut off.
10. Bristle-pointed.	Aristate, or awned.	Ending in a long, stiff, hard point, as in oat flowers.

1. ***Sharp.***
(*Acute.*)

Rose.
Peach.
Mint.
Mullein.
Lilac.

2. ***Tapering.***
(*Acuminate.*)

Birch.
Willow.
Lily.
Milkweed.
Walnut.

3. ***Blunt.***
(*Obtuse.*)

Forget-me-not.
Primrose.
Heliotrope.
Hemlock.
Garden rhubarb.

4. ***Abruptly-pointed.***
(*Cuspidate.*)

Wiegelia.
Grape.
Wistaria.
Ailanthus.
Calycanthus.

5. ***Stiff-pointed.***
(*Mucronate.*)

Thistle.
Scrub-oak.
Holly.
Cotton-plant.
Chestnut.

6. ***Turned-in.***
(*Retuse.*)

Locust.
Pittosporum.
Vetch, or
Tares.
Yellow clover.

7. ***Slightly-notched.***
(*Emarginate.*)

Buffalo clover.
Geranium emarginata.
Oxalis speciosa.
Yellow melilot.
Milk vetch.

8. ***Heart-shaped.***
(*Obcordate.*)

Mountain sorrel.
Achyranthes.
Oxalis stricta.
Spotted medick.
White clover.

9. ***Cut-off.***
(*Truncate.*)

Tulip-tree.
Some cactuses.
White melilot, or
Sweet-scented clover.
Vetch hirsuta.

SURFACE OF LEAVES.

	Familiar Name.	*Scientific Name.*	*Description.*	*Examples.*
	Smooth.	Glabrous.	Without hairs of any kind; smooth.	Bloodroot, cabbage, sycamore, pear.
Soft hairs	Hairy, short.	Pilose.	Having a few soft, short, slender hairs.	Henbit, comfrey, morning-glory.
	Hairy, long.	Hirsute.	Having a few soft, long hairs.	Corn-cockle, agrimony.
	Downy.	Pubescent.	Having dense, soft, short hairs.	Honesty, pear, gooseberry, apple.
	Velvet-like.	Villose.	Having dense, soft, long hairs.	Catnip, hairy-bush clover, foxglove.
	Silky.	Sericeous.	Having soft, silk-like hairs.	Five-finger, some willows, silver-leaf poplar.
	Wooly.	Lanuginous.	Having soft, cotton or wool-like hairs.	Mullein, quince, chamomile.
	Felt-like.	Tomentose.	Having soft hairs, matted together.	Grape, apple, quince, hardhack.
	Cobwebby.	Arachnoidea.	Having long, fine hairs interlaced like a cobweb.	Thistle, cobwebby houseleek, summer grapes.
Stiff hairs	Stiff-haired.	Hispid.	Having a few short, stiff hairs.	Rose acacia, raspberry, pumpkin.
	Bristle-like.	Setose.	Having hairs stiff like bristles.	Hedge nettle, asparagus, borrage.
	Spiny, rough.	Scabrous.	Having stiff hairs, like short, hard, even points.	Oriental poppy, carex, elm.
	Sticky, or clammy.	Viscid.	Covered with a moist, sticky substance.	Petunia, scarlet geranium.

SUBSTANCE OF LEAVES.

Fleshy.	Succulent.	Thick and juicy.	Live-for-ever, ice-plant, century-plant.
Leathery.	Coriaceous.	Thick, tough, and leather-like.	Oleander, magnolia, camelia, kalmia.
Dry.	Scarious.	Thin, dry, and membranous.	Cuscuta lepidanche, flax dodder.
Wrinkled.	Rugose.	Roughened with wrinkles.	Sage, English cowslip, foxglove, balm.

DURATION OF LEAVES.

Early-falling.	Fugaceous.	Falling in summer.	Spiranthes, or ladies'-tresses.
Late-falling.	Deciduous.	Falling in autumn.	Maple, apple, ailanthus.
Evergreen.	Persistent.	Continuing one winter or more.	Pines, fir, arbor vitæ, box.

KINDS OF MARGINS.

Familiar Name.	*Scientific Name.*	*Description.*
Plain.	Entire.	Having an even or smooth edge.
Wavy, or	Undulate, or	Having an edge curved in and out, like a wave line; or,
Umbrella-edged.	Repand.	Having an edge curved in and out, like the edge of an umbrella.
Spiny.	Spinescent.	Having stiff, sharp points.
Frilled, or curled.	Crispate.	Having a full, curled, or twisted edge.
* Saw-toothed.	Serrate.	Having teeth pointing forward, like the teeth of a saw.
* Toothed.	Dentate.	Having teeth pointing outward.
* Scalloped.	Crenate.	Having round divisions, like scallops.
Deeply-wavy.	Sinuate.	Having deep, round openings, resembling bays.
Deeply-cut.	Incised.	Having deep, irregular teeth.
† Lobed.	Lobate.	Cut about half-way to the midvein, with rounded openings.
† Cleft.	Cleft.	Cut about half-way to the midvein, with sharp openings.
† Parted.	Parted.	Cut almost through to the midvein.
† Divided.	Divided.	Cut through to the midvein, but not into separate leaflets.

* Margins may be *finely*, *coarsely*, *doubly*, or *unevenly* toothed, saw-toothed, or scalloped.

† May be three-lobed, five-lobed, etc., or three-cleft, five-cleft, three-parted, five-parted, etc.

NOTE. — Pinnately-lobed, etc., leaves are feather-veined; palmately-lobed, etc., leaves are palmately-veined.

EXAMPLES OF MARGINS.

Plain. (*Entire.*)	***Wavy.*** (*Repand, or Undulate.*)	***Spiny.*** (*Spinescent, or Spinous.*)
Lilac.	Nasturtium.	Holly.
Lily.	Egg plant.	Thistle.
Morning-glory.	Yellow dock.	Live oak.
Corn.	Fig.	Century plant.
Grass.	Cabbage.	Saw palmetto.

Frilled, or Curled. (*Crisped.*)	***Lobed.*** (*Lobate.*)	***Saw-toothed.*** (*Serrate.*)
Crisped mallow.	Red oak.	Rose.
Cabbage.	White oak.	Peach.
Curled dock.	Ivy.	Apple.
Endive.	Maple.	Barberry.
Curled parsley.	Castor-oil plant.	Dahlia.

Finely Saw-toothed. (*Serrulate.*)	***Coarsely Saw-toothed.*** (*Coarsely Serrate.*)	***Unevenly Saw-toothed.*** (*Unequally Serrate.*)
Weeping willow.	Hazel-nut.	Black mulberry.
White birch.	Hemp.	Wild blackberry.
Wild red cherry.	White-weed.	Raspberry.
Flowering almond.	Yellow birch.	Sweet brier.
·-ope.	Chestnut.	Spearmint.

EXAMPLES OF MARGINS. — *Continued.*

Doubly Saw-toothed. (*Doubly Serrate.*)	***Toothed.*** (*Dentate.*)	***Finely Toothed.*** (*Denticulate.*)
White birch.	Strawberry.	Pumpkin.
Elm.	Parsnip.	Wintergreen.
Hazel-nut.	Wood anemone.	Squash.
Black currant.	Lemon.	White clover.
Slippery elm.	Yellow melilot.	Fuchsia.

Coarsely Toothed. (*Coarsely Dentate.*)	***Unevenly Toothed.*** (*Unequally Dentate.*)	***Bitten Toothed.*** (*Erose Dentate.*)
China aster.	Fireweed.	Wild sage, or
Pigweed.	Thorn apple.	Salvia lyrata.
Wild strawberry.	Plantain.	Black nightshade, or
Agrimony.	White avens.	Solanum nigrum.
Oak.	Mullein-leaved verbena.	Cardinal monkey-flower.

Scalloped. (*Crenate.*)	***Finely Scalloped.*** (*Crenulate.*)	***Coarsely Scalloped.*** (*Coarsely Crenate.*)
Catnip.	Orange.	The branches of the rose-colored cactus.
Cowslip.	Sage.	Bryophyllum calycinum.
Garden daisy.	Round-leaved pyrola.	Balm.
Horse-radish.	Crisped mallow.	Triangle-leaved mallow.
Cranberry.	Deutzia.	

Doubly Scalloped. (*Doubly Crenate.*)	***Prickle Pointed.*** (*Mucronate.*)
Horse shoe geranium.	Black oak.
Scarlet geranium.	Spanish oak.
Pennywort.	Begonia.
Dwarf mitella.	Mountain ash.
Henbit.	Woodbine.

1. ***Feather-lobed.***
(*Pinnately-lobed.*)

Parsnip.
Ragweed.
Chrysanthemum.
Red oak.
White oak.

2. ***Feather-cleft.***
(*Pinnately-cleft.*)

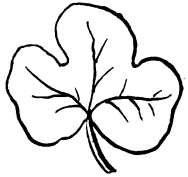
Herb Robert.
Oak-leaf geranium.
Watermelon.
Carrot.
Thistle.

3. ***Feather-parted.***
(*Pinnately-parted.*)

Dusty miller.
Mourning bride.
Coreopsis.
Tansy.
Cypress vine.

4. ***Feather-divided.***
(*Pinnately-divided.*)

French marigold.
Celery.
Southernwood.
Peony.
Yarrow.



5. ***Hand-lobed.***
(*Palmately-lobed.*)

Grape.
Currant.
English ivy.
Raspberry.
Mulberry.
Cucumber.

6. ***Hand-cleft.***
(*Palmately-cleft.*)

Maypops.
Castor-oil plant.
Globe-flower.
White mustard.
Sycamore maple.
Colocynth.

7. ***Hand-parted.***
(*Palmately-parted.*)

May apple.
Wild geranium.
Blue passion-flower.
Pennyroyal geranium.
Rose geranium.
Scarlet hibiscus.

8. ***Hand-divided.***
(*Palmately-divided.*)

Hellebore.
Larkspur.
Aconite.
Buttercup.
Bee larkspur.
Yellow aconite.

SHAPES OF LEAVES.

LEAVES BROADEST AT THE BASE.

Familiar Name.	*Scientific Name.*	*Description.*
1. Egg-shaped.	Ovate.	Like a slice of an egg cut lengthwise; round at the base and tapering toward the apex.
2. Lance-shaped.	Lanceolate.	Shaped somewhat like a soldier's lance; round at the base, long and tapering toward the apex.
3. Heart-shaped.	Cordate.	Shaped somewhat like a heart; having two round lobes at the base and tapering toward the apex.
4. Kidney-shaped.	Reniform.	Shaped somewhat like a kidney; having two round lobes at the base and round at the apex.
5. Arrow-shaped.	Sagittate.	Shaped somewhat like an arrow; having sharp-curved lobes at the base and tapering toward the apex.
6. Spear-shaped.	Hastate.	Shaped somewhat like a spear; having spreading lobes at the base and tapering toward the apex.
7. Delta-shaped.	Deltoid.	Shaped somewhat like the Greek letter "delta," Δ; having some resemblance to a triangle.
8. Awl-shaped.	Subulate.	Shaped somewhat like an awl; very narrow, and blunt-pointed at the apex.
9. Slanting.	Oblique.	Having one-half of the leaf longer than the other at the base, and tapering to the apex.

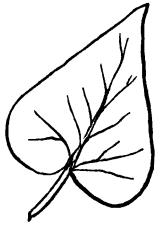
SHAPES OF LEAVES. — *Continued.*

1.
Egg-shaped.
(*Ovate.*)

Rose.
Pear.
Apple.
Quince.
Garden bean.
Heliotrope.
Lily-of-the-valley.

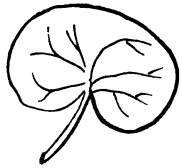
2.
Lance-shaped.
(*Lanceolate.*)

Peach.
Flax.
Balsam.
Sweet-william.
Oleander.
Golden rod.
Yellow dock.



3.
Heart-shaped.
(*Cordate.*)

Lilac.
Violet.
Catalpa.
Burdock.
Sunflower.
Morning-glory.
Red-bud tree.

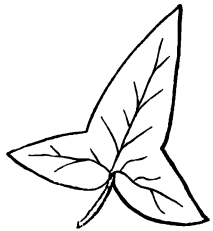


4.
Kidney-shaped.
(*Reniform.*)

Ground ivy.
Colt's-foot.
Bloodroot.
Pennywort.
Pipe-vine.
Wild ginger.
Scarlet geranium.

5.
Arrow-shaped.
(*Sagittate.*)

Calla.
Spinach.
Field bindweed.
Arrowhead.
Arrow-arum.
Scarlet knot-grass.
Caladium.

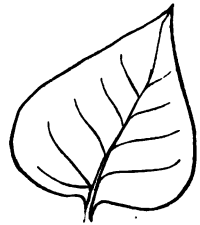


6.

Spear-shaped.

(*Hastate.*)

Sweet potato.
Bittersweet.
White lettuce.
Buckwheat.
Canary sage.
Sheep sorrel.
Halberd-leaf knotweed.



7.

Delta-shaped.

(*Deltoid.*)

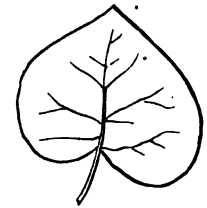
White birch.
Birthroot.
Mercury.
Nodding trillium.
Lombardy poplar.
Nettle-leaf salvia.
Lima bean.

8.

Awl-shaped.

(*Subulate.*)

Juniper.
Cypress tree.
Jonquil.
Red cedar.
Arbor vitæ.
Awlwort, or
Subularia aquatica.



9.

Slanting.

(*Oblique.*)

Linden, or basswood.
Begonia rex.
Tuberous begonia.
Flowering begonia.
Nettle-tree.
Elm.
Witch-hazel.

SHAPES OF LEAVES. — *Continued.*

LEAVES BROADEST IN THE MIDDLE.

Familiar Name.	*Scientific Name.*	*Description.*
1. Oblong-shaped.	Oblong.	A leaf, two or three times longer than broad, and having nearly equal blunt ends.
2. Ellipse-shaped.	Elliptical.	Shaped somewhat like an ellipse; like an oblong leaf, but more tapering at the ends.
3. Oval-shaped.	Oval.	Like an elliptical leaf, but broader; having both ends equally sharp-pointed.
4. Circular-shaped.	Orbicular.	Shaped somewhat like an orb; having the margin almost circular.
5. Needle-shaped.	Acerose.	Shaped somewhat like a needle; long, slender, and sharp pointed.
6. Line-like.	Linear.	Shaped somewhat like a line; narrow and long, with the edges nearly parallel to the apex.
7. Sword-shaped.	Ensiform.	Shaped somewhat like a sword; long, narrow, and tapering to a point.
8. Ear-shaped.	Auriculate.	Shaped somewhat like ears at the base; having two lobes at the base resembling the lobes of the human ear.
9. Fan-shaped.	Flabelliform.	Shaped somewhat like a fan.

1.

Oblong.

(*Oblong.*)

Sweet bay.
Banana.
Primrose.
Milkweed.
Live oak.
Foxglove.
Rose bay.

3.

Oval-shaped.

(*Oval.*)

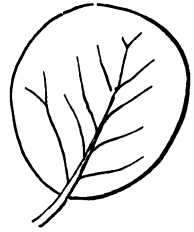
Hydrangea.
Petunia. Holly.

2.

Ellipse-shaped.

(*Elliptical.*)

Low blueberry.
French rose.

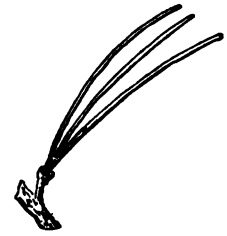


4.

Circular.

(*Orbicular.*)

Pennywort.
Nasturtium.
Wintergreen (pyrola).
Lettuce-liverwort.
Partridge-berry.
Round-leaf mallow.
Round-leaf sundew.



5.

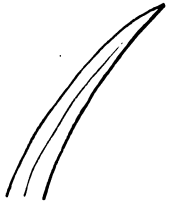
Needle-shaped.

(*Acerose.*)

Larch.
Red pine (2 needles, 5′ to 8′).
Pitch pine (3 " 3′ to 5′).
White pine (5 " 3′ to 5′).
Yellow pine (2 or 3 " 3′ to 5′).
Long-leaf pine (3 " 10′ to 15′).
Black spruce.

SHAPES OF LEAVES. — *Continued.*

6.
Line-like.
(*Linear.*)
Grass.
Corn.
Pink.
Yew.
Thrift.
Snap-dragon.
Hemlock. Spruce.



7.
Sword-shaped.
(*Ensiform.*)
Iris.
Sweet flag.
Gladiolus.
White lily.
Yellow lily.
Cat-tail.
Spider-wort.

8.
Ear-shaped.
(*Auriculate.*)
Sage.
Ear-leaf magnolia.
Bitter-sweet.
Fire-weed.
Sorrel.
Coreopsis-auriculata.
Shepherd's purse.

9.
Fan-shaped.
(*Flabelliform.*)
Great fan-palm.
Ginkgo-tree.
Cacalia reniformis.
Palmetto.
Doum palm.
Palmyra palm.
Wild date-palm.

LEAVES BROADEST AT THE APEX.

Familiar Name.	*Scientific Name.*	*Description.*
1. Inversely ovate.	Obovate.	Like an ovate leaf turned upside down; having a broad, round apex and a short, sharp base.
2. Inversely lance-shaped.	Oblanceolate.	Like a lance-shaped leaf turned upside down; having a broad, round apex and a long, tapering base.
3. Inversely heart-shaped.	Obcordate.	Like a heart-shaped leaf turned upside down; having a heart-shaped apex and a short, tapering base.
4. Wedge-shaped.	Cuneate.	Shaped somewhat like a wedge; having a very broad apex and a gradually tapering base.
5. Spatula-shaped.	Spatulate.	Shaped somewhat like a spatula.

1.

Inversely Ovate.
(*Obovate.*)

English daisy.
Witch hazel.
Shell-bark hickory.
Buffalo clover (lfts.).
Horse-chestnut.
Blueberry.
Aromatic wintergreen.

2.

Inversely Lance-shaped.
(*Oblanceolate.*)

Daisy.
Papaw, or
Custard apple.
Common lupin.
Water-oak.
Dyer's cleavers.
Chickasaw plum.

3.

Inversely Heart-shaped.
(*Obcordate.*)

White clover.
Spotted medick.
Wood sorrel (oxalis).
Prairie clover.
Achyranthes.
Astralgus.
Swamp-pink.

4.

Wedge-shaped.
(*Cuneate.*)

Carpet-weed.
Black Jack oak.
Shrub-candytuft.
Dry-strawberry (lfts.).
Wedge-leaf sundew.
Cockspur thorn.
Wild cinquefoil (lfts.).

5.

Spatula-shaped.
(*Spatulate.*)

Ox-eyed daisy.
Polyanthus.
Virginia catchfly.
Bluets.
Water-oak.
Downy wild indigo.
Innocence.

SHAPES OF LEAVES. — *Continued.*

KINDS ACCORDING TO MARGINS, Etc.

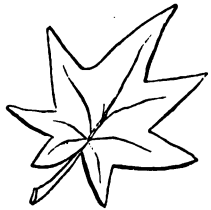
Familiar Name.	*Scientific Name.*	*Description.*
1. Lobed-backward.	Runcinate.	Having the lobes pointing backward; as in dandelion leaves.
2. Lyre-shaped.	Lyrate.	Shaped somewhat like a lyre. Having the top lobe much larger and broader than the others.
3. Gashed.	Laciniate.	Deeply divided on the edge, as if cut by scissors.
4. Feather-cleft.	Pinnatifid.	Cut about half-way to the midvein with narrow, sharp incisions. Same as pinnately cleft.
5. Twice feather-cleft.	Bipinnatifid.	Twice pinnatifid. Having the lobes cut about half-way to the midvein. — Chamomile, feverfew, parsley.
6. Hand-shaped.	Palmate (digitate).	Shaped somewhat like a hand. Having lobes spreading outward like fingers from the palm of the hand.
7. Bird's-foot shaped.	Pedate.	Shaped somewhat like a bird's foot. Having several lobes, those at the base turning backward like the toes of a bird.
8. Frilled, or curled.	Crisped.	Shaped somewhat like a frill. Having a very full margin; as, cabbage, crisped mallow, curled dock.
9. Tube-shaped.	Tubular.	Shaped somewhat like a tube. Round and stalk-shaped; as the onion leaf.
10. Scale-shaped.	Scaly.	Short, blunt, and scale-like; as some leaves of the red cedar.

1. ***Lobed-backward.***
(*Runcinate.*)
Wild lettuce.
Hedge mustard.
Dandelion.
Succory.
Sow thistle.

2. ***Lyre-shaped.***
(*Lyrate.*)
Turnip.
Radish.
White mustard.
White oak.
Wild radish.

3. ***Gashed.***
(*Laciniate.*)
Aconite.
Larkspur.
Crowfoot.
Hawkbit.
Agrimony.

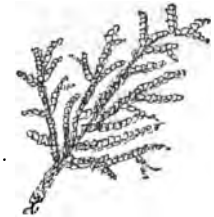
4. ***Feather-cleft.***
(*Pinnatifid.*)
Cypress vine.
Sweet fern.
Thistle.
Watermelon.
Some ferns.



6. ***Hand-shaped.***
(*Palmate.*)
Sweet gum.
Red maple.
Sugar maple.
Castor-oil plant.
Currant.

7. ***Bird's foot-shaped.***
(*Pedate.*)
Bird's-foot violet.
Passion flower.
Maiden-hair fern.
Green hellebore.
Green dragon.

9. ***Tube-shaped.***
(*Tubular.*)
Onion.
Chives.
Field garlic.
Schallot.
Allium proliferum.



10. ***Scale-like.***
(*Scaly.*)
Arbor vitæ.
Red cedar.
White cedar.
Orange-grass, or
Pine-weed.

NOTE.

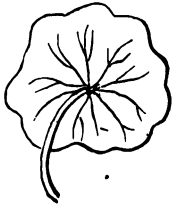
ALL the *feathered-shaped* and *fingered-shaped* leaves, whether they be *lobed*, *cleft*, *parted*, or *divided*, are simple leaves. Beginners often find it difficult to distinguish between some forms of these and the compound leaves described and illustrated on pages 92–95. This mistake will be avoided if it be fully understood that in all simple leaves there is always a portion of the leaf between the divisions of the margin.

In *pinnately-divided* and *palmately-divided* leaves, this portion is often so exceedingly *narrow* that it makes the veins of these varieties appear like the stems of compound leaves, and thus leads to the error we have mentioned.

SHAPES OF LEAVES. — *Continued.*

KINDS ACCORDING TO STEM-ARRANGEMENT.

Familiar Name.	*Scientific Name.*	*Description.*
1. Shield-shaped.	Peltate.	Shaped somewhat like a shield. Having the petiole placed near the centre of the back of the leaf.
2. Down-running.	Decurrent.	Having the lobes at the base fastened to the sides of the stem.
3. Stem-clasping.	Amplexicaul.	Having the lobes at the base surrounding the stem.
4. Perforated.	*a.* Perfoliate.	Seeming to have the stem passing through the base of the leaf.
	b. Connate.	Seeming to have the stem passing through the united bases of two leaves.
5. Bundled.	Fascicled.	Having the leaves arranged in tufts or bundles.
6. Whorled.	Verticillate.	Having the leaves arranged around the stem in a circle or whorl.
7. Sheathing.	Sheathing.	Having the leaf-stalk surrounding the stem; as in grasses.
8. Straddling.	Equitant.	Having the bases of opposite leaves overlapping; as in iris.



1.

Shield-shaped.

(*Peltate.*)

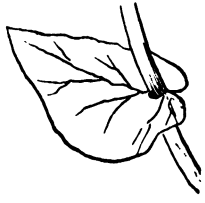
Nasturtium.
Castor-oil plant.
White water-lily.
Caladium.
Water-shield.

2.

Down-running.

(*Decurrent.*)

Thistle.
Mullein.
Tobacco.
Comfrey.
Yellow-leaf-cup.

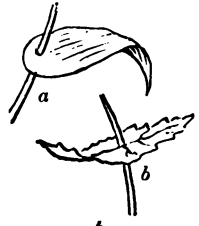


3.

Stem-clasping.

(*Amplexicaul.*)

Opium poppy.
Solomon's seal.
Aster lævis.
Elecampane.
Ox-eyed daisy.



4.

Perforated.

(a. *Connate*; b. *Perfoliate.*)

Some honeysuckles.
Boneset.
Fuller's teasel.
Cup-plant.
Bellwort (*b*).

5.

Bundled.

(*Fascicled.*)

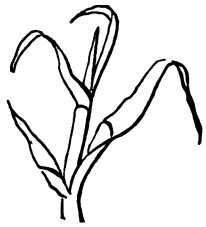
Larch.
Red pine.
Pitch pine.
White pine.
Jersey pine.

6.

Whorled.

(*Verticillate.*)

Lupin.
Red lily.
Indian cucumber.
Cleavers.
Chick-wintergreen.



7.

Sheathing.

(*Sheathing.*)

Grasses.
Corn.
Sedges.
Lilies.
Rush.

8.

Straddling.

(*Equitant.*)

Lily.
Iris.
Gladiolus.
Amaryllis.
Grasses.

NOTE.

VERY often we find that a leaf resembles more than one of the shapes just described. For example: it may be neither exactly egg-shaped (ovate) nor lance-shaped (lanceolate), but somewhat like each of these shapes; in this case, it is said to be lance-ovate. In like manner some leaves are described as lance-oblong, linear-lanceolate, or wedge-obovate, etc.

Sometimes the same plant has more than one kind of leaf. *Example:* The sassafras tree has ovate, obovate, and three-cleft leaves. The honey locust has feathered (pinnate) and twice-feathered (bi-pinnate) leaves.

The root-leaves of some plants differ greatly in shape from the stem-leaves; to describe such plants as to their leaves it is necessary to obtain specimens of each kind.

The month of June is usually a favorable time to make collections of leaves, if we wish to see them in their greatest beauty of shape, and free from the ravages of insects.

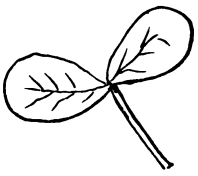
PARTS OF A COMPOUND LEAF.

Familiar Name.	*Scientific Name.*	*Description.*
Main stem.	Rachis.	The lengthened leaf-stem to which the leaflets are fastened. See PETIOLE.
Branch stem.	Petiolule.	The stem of a leaflet.
Leaflets.	Leaflets.	One of the blades.
Stipels.	Stipels.	The little leaf-like parts at the base of leaflets. See STIPULES.

KINDS OF COMPOUND LEAVES.

FEATHERED LEAVES (Pinnate Leaves).

1. Feathered.	Pinnate.	Having leaflets branching from the sides of the lengthened leaf-stem or petiole.
2. One-feathered.	Monate.	Having only one leaflet on the lengthened petiole.
3. Two-feathered.	Binate.	Having only two leaflets on the lengthened petiole.
4. Three-feathered.	Ternate.	Having only three leaflets on the lengthened petiole.
5. Equally-feathered.	Equally pinnate.	Having two leaflets at the top end of the main stem.
6. Unequally-feathered.	Unequally pinnate.	Having one leaflet at the top end of the main stem.
7. Tendril-feathered.	Cirrhose pinnate.	Having a curl or tendril at the top end of the main stem.
8. Interruptedly-feathered.	Interruptedly pinnate.	Having large and small leaflets alternately.
9. Twice-feathered.	Bi-pinnate.	Having feathered leaves on each petiolule.
10. Thrice-feathered.	Tri-pinnate.	Having leaflets branching from a third stem which branches from a petiolule.
11. Many-times-feathered.	Decompound.	More than twice- or thrice-feathered; as, Columbine, fennel, parsley.



3. ***Two-feathered.***
(*Binate.*)

Rheumatism-root.
Dwarf dogwood.

2. ***One-feathered.***
(*Monate.*)

Lemon.
Orange.

4. ***Three-feathered.***
(*Ternate.*)

Sweet-scented clover.
String bean.
Scarlet pole-bean.
Lima bean.
Bush bean.
Yellow melilot.
Blackberry.

5. ***Equally-feathered.***
(*Abruptly pinnate.*)

Peanut (2 pair lfts.).
Sensitive senna (6-15).
Honey locust (about 18).
American senna (6-9).
Dwarf cassia (8-12).
Common tare (10-14).
Wild sensitive plant (6-15).

6. ***Unequally-feathered.***
(*Oddly pinnate.*)

Sumach (11-31 lfts.).
Dahlia (9).
Rose (3-7).
Black walnut (15-21).
Hickory (7-11).
Wistaria (9-13).
Ailanthus (21-41).

7. ***Tendril-feathered.***
(*Cirrhose.*)

Common pea.
Sweet pea.
Everlasting pea.
Lentil.
Marsh pea.
Tufted vetch.
Creeping vetch.

8. ***Interruptedly-feathered.***
(*Interruptedly pinnate.*)

Water avens.
Yellow avens.
Agrimony.
Potato.
Meadow sweet.
Silver-weed.
Pride-of-the-meadow.

9. ***Twice-feathered.***
(*Bi-pinnate.*)

Coffee tree.
Honey locust.
Sensitive plant.
Acacia.
Fool's parsley.
Poison hemlock.
Coriander.
Sponge-tree.

10. ***Thrice-feathered.***
(*Tri-pinnate.*)

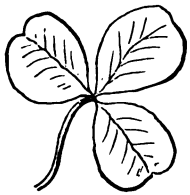
Spikenard.
Meadow rice.
Poison hemlock.
Coffee tree.
Honey locust.
Some acacias.
Feverfew.

KINDS OF COMPOUND LEAVES. — *Continued.*

FINGERED LEAVES (Digitate Leaves).

Familiar Name.	*Scientific Name.*	*Description.*
1. Fingered.	Digitate.	Having the leaflets branching from the top of the petiole.
2. Three-fingered.	Tri-digitate, or ternate.[1]	Having three leaflets branching from the top of the petiole.
3. Five-fingered.	Pent-digitate, or quinate.	Having five leaflets branching from the top of the petiole.
4. Seven-fingered.	Hept-digitate, or septinate.	Having seven leaflets branching from the top of the petiole.
5. Many-fingered.	Mult-digitate, or multinate.	Having more than seven leaflets branching from the top of the petiole.
6. Twice-three-leaved.	Bi-ternate.	A ternate leaf with ternate leaflets.
7. Thrice-three-leaved.	Tri-ternate.	A ternate leaf with bi-ternate leaflets.
8. Many times three-leaved.	Ternately decompound.	More than three times three-fingered, as meadow rue.

[1] *Ternate*, in divisions of threes.



2.

Three-fingered.
(*Ternate.*)

Red clover.
White clover.
Poison ivy.
Wood sorrel.
Laburnum.
Goldthread.
Clematis.

3.

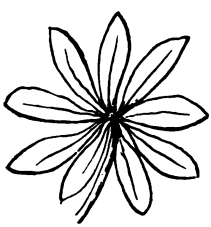
Five-fingered.
(*Quinate.*)

Hemp (5–7).
Ginseng.
Red buckeye.
Sweet buckeye.
Virginia creeper.
Wild sarsaparilla.
Cinquefoil.

4.

Seven-fingered.
(*Septinate.*)

Hemp (5–7).
Walnut.
Horse chestnut.
Sweet buckeye.
Philadelphia lupin.
Silvery cinquefoil.
Cleome.



5.

Many-fingered.
(*Multinate.*)

Common lupin.
Tree lupin.
Many-leaved lupin (11-15).
Chick wintergreen (5-8).
Cleavers (5-8).
Nootka Sound lupin (5-9).
Sun-dial lupin (5-7).

6.

Twice-three-leaved.
(*Bi-ternate.*)

Fumaria.
Rue anemone.
Wild columbine.
Garden columbine.
Mountain fringe.
Corydalis.
Erigenia bulbosa.

7.

Thrice-three-leaved.
(*Tri-ternate.*)

Baneberry.
Blue cohosh.
Erigenia bulbosa.
Dutchman's breeches.
Squirrel corn.
Bleeding heart.
Columbine.

INFLORESCENCE.

Familiar Name.	*Scientific Name.*	*Description.*
Flower-arrangement.	Inflorescence.	The way in which flowers are arranged on the stem.
	PARTS OF THE INFLORESCENCE.	
Flower-stem.	Peduncle.	The main stem of a flower or flower-cluster.
Pedicel.	Pedicel.	A branch of a peduncle or main flower-stem.
Bracts.	Bracts.	Small leaves of a flower-cluster upon the peduncle or flower-stem.
Bractlets.	Bractlets.	Small leaves of a flower-cluster upon the pedicels.
Involucre.	Involucre.	A circle or whorl of bracts.
Involucel.	Involucel.	A circle or whorl of bracts around a pedicel.
Rachis.	Rachis.	The lengthened peduncle or flower-stem.
Receptacle.	Receptaculum, or Torus.	The top end of the peduncle.
	KINDS OF INFLORESCENCE.	
One-flowered.	Solitary.	Having only one flower upon the flower-stem.
Many-flowered.	Clustered.	Having more than one flower upon the same flower-stem.
Stemless.	Sessile.	Having no flower-stem.
One-flowered terminal.	Solitary terminal.[1]	Having only one flower at the *top end* of a stem.
One-flowered axillary.	Solitary axillary.	Having only one flower in the *axil* of a leaf.
Terminal cluster.	Terminal cluster.[2]	Having a cluster of flowers at the *top end* of a stem.
Axillary cluster.	Axillary cluster.	Having a cluster of flowers in the *axil* of a stem.
	STEM-END INFLORESCENCE (Terminal Inflorescence).	
Stem-ending inflorescence.	Definite inflorescence.	An inflorescence which ends the growth of a stem or branch.
Not stem-ending inflorescence.	Indefinite inflorescence.	An inflorescence which does not end the growth of a stem or branch.

[1] All *solitary terminal* flowers end the growth of a stem or branch.

[2] Terminal cluster-flowers end the growth of a stem or branch when their central buds open before those on the outer edge.

ATTITUDE OF INFLORESCENCE.

Upright.	Erect.	In a standing position: hollyhock, mullein, lavender, foxglove, rye, wheat.
Nodding.	Nodding.	Bending over slightly: lily-of-the-valley, morning-glory, dielytra, yellow lily, dog-tooth violet.
Drooping.	Pendulous.	Hanging downward: currant, locust tree, fuchsia, laburnum, whistlewood.

VARIETIES OF INFLORESCENCE.

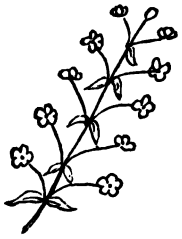
Axillary Inflorescence. — *Lower or outer edge-buds opening first. (Inflorescence centripetal.)*

A. Flowers on Pedicels.	1. Raceme.	A long rachis with pedicels of nearly equal length along its sides.
	2. Corymb.	A short rachis, the lower pedicels lengthened to make the top of the cluster flat.
	3. Umbel.	No rachis, but pedicels of nearly equal length starting from about the same point of the [stem.
B. Flowers Sessile.	4. Spike.	A long rachis with no pedicels. (A raceme on which the flowers are sessile.)
	5. Spadix.	A long, fleshy rachis with no pedicels, generally surrounded by a large bract called a *spathe*.
	6. Ament, or Catkin.	A long, slender, drooping rachis with no pedicels, but having scaly bracts.
	7. Head.	A very short rachis, upon which flowers are clustered in a globe-like form.
C. Flowers Compound.	8. Compound raceme, or Panicle.	A raceme with its pedicels branched.
	9. Thyrse.	A dense panicle, shaped somewhat like a pyramid.
	10. Compound corymb.	A corymb with its pedicels branched.
	11. Compound umbel.	An umbel with its pedicels branched.

Terminal Inflorescence. — *Top or Central buds opening first. (Inflorescence centrifugal.)*

D. Cymes.	12. Cyme.	Flat-topped like a corymb, but having its *central* buds blossoming first.
	13. Fascicle.	A bundle-like cyme.
	14. Glomerule.	A head-like cyme. (It differs from a true head because its central flowers blossom first).
	15. Verticillaster, or Whorl.	Two dense cymes joined in opposite axils of a pair of leaves. (By some called a *glomerule*.)
	16. Scorpoid cyme.	A one-sided, coiled cyme.

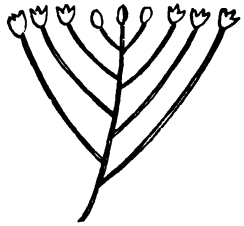
EXAMPLES OF INFLORESCENCE.



1.

Raceme.

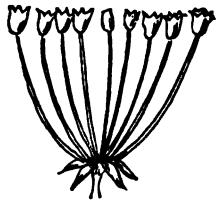
Currant.	Lupin.
Black cherry.	Laburnum.
Lily-of-the-valley.	Tobacco.
Locust.	Lobelia.
Bleeding heart.	Barberry.
Blackberry.	Choke cherry.
Bean.	Sycamore maple.
Wistaria.	Spring beauty.
Rose acacia.	Cardinal flower.
Pea.	Coleus.
Hyacinth.	Huckleberry.



2.

Corymb.

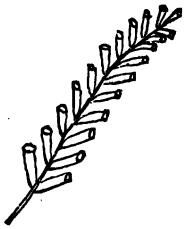
Trumpet creeper.	Candytuft.
Pear.	English cowslip.
Meadow sweet.	Everlasting.
Fuchsia.	Marigold.
Common flax.	Sassafras.
Mock orange.	Sweet alyssum.
Sweet syringa.	Some asters.
Drummond phlox.	Calceolaria.
Prairie rose.	Cuphea.
Yarrow.	Spiræa.
Dusty miller.	Sarsaparilla.



3.

Umbel.

Milkweed.
Onion.
Pennywort.
Wood sorrel.
Primrose.
Apple.
Garden cherry.
Rue anemone.
Red maple.
Sugar maple.
Scarlet geranium.



4.

Spike.

Holyhock.	Pigweed.
Plantain.	Foxglove.
Mullein.	Beet.
Timothy grass.	Prince's feather.
Rye.	Evening primrose.
Barley.	Banana.
Wheat.	Lavender.
Indian corn.	Pickerel weed.
Mignonette.	American aloe.
Tuberose.	Scouring rush.
Gladiolus.	Garden verbena.

5.

Spadix.

Calla.
Indian turnip.
Sweet flag.
Palm.
Golden club.
Cat-tail.
Palmetto.
Green dragon.
Skunk cabbage.
Dwarf palmetto.
Caladium.

6.

Catkin, or Ament.

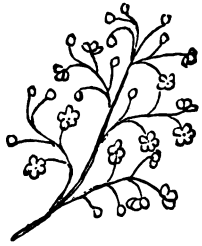
Willow.	Spruce.
Aspen.	Pecan nut.
Birch.	Filbert.
Chestnut.	Hornbeam.
Oak.	Sweet fern.
Hickory.	Pine.
Hazel.	Cypress.
Poplar.	Juniper.
Alder.	Fir.
Beech.	Larch.
Hop.	Cedar.

EXAMPLES OF INFLORESCENCE. — *Continued.*

7.

Head, or Capitulum.

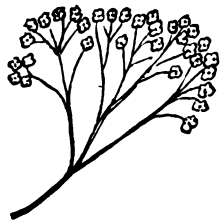
Red clover.	Zinnia.
White clover.	Dusty miller.
Marigold.	Colt's-foot.
Daisy.	Pigweed.
Dandelion.	Golden rod.
Dahlia.	Chicory.
Button bush.	Buttonwood.
Thistle.	Globe amaranth.
Sunflower.	Mourning bride.
Aster.	Immortelle.
Ageratum.	Tassel-flower.



8.

Compound Raceme, or Panicle.

Oat.	Meadow sweet.
Rice.	Orchard grass.
Chess.	Meadow grass.
Ailanthus.	Millet grass.
Smoke-tree.	Reed grass.
Sumach.	Meadow rue.
Spikenard.	Pampas grass.
Some asters.	Golden rod.
Catalpa.	Century plant.
Pale jewel-weed.	Broom corn.
Castor-oil plant.	Spurrey.



10.

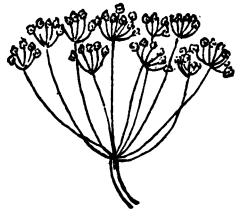
Compound Corymb.

Mountain ash.
Buckwheat.
Choke berry.

9.

Thyrse.

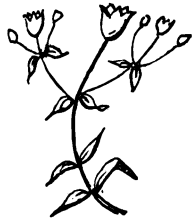
Lilac. Grape.
Horse chestnut.
Sweet buckeye.
Smooth sumach.
Oval-leaved ceanothus.



11.

Compound Umbel.

Parsley.
Caraway.
Fennel.
Carrot.
Coriander.
Parsnip.
Dill.
Anise.
Sweet cicely.
Poison hemlock.
Fools' parsley.



12.

Cyme.

Hydrangea.
Dogwood.
Rose.
Oleander.
Buttercup.
Snowball.
Linden.
Live-for-ever.
Stonecrop.
Virginia creeper.
Apple.

13.

Fascicle.

Bunch pink, or
Sweet William.
Scarlet lychnis.
Wild pink.
Sensitive pea.
Ragged Robin.
Four-o'clock.
Sweet potato.
Bouncing Bet.
Whip-grass.
Hydrophyllum.

14.

Glomerule, or Whorl.

Mint.
Balm.
Peppermint.
Wild mint.
Wild sage.
Thyme.
Catnip.
Garden sage.
Bugle weed.
Mountain mint.
Clarry.
Savory.
Hyssop.
Horehound.
Hemp-nettle.
Motherwort.
Pennyroyal.
Betony.
Water milfoil.
Blue-curls.
Lycopus Europæus.
Wild basil.

16.

Scorpoid Cyme.

Forget-me-not.
Pink-root.
Heliotrope.
Phacelia.
Sundew.

17.

Compound Cyme.

Mulberry.
Dogwood.
Hydrangea.

SHAPES OF FLOWERS. (*Corollas.*)

I.

ONE-PETALLED FLOWERS. (Monopetalous corollas.)

PARTS.
- Tube . . . . . The united part of the flower or corolla.
- Limb or border . The upper part of the flower or corolla.
- Throat . . . . The opening of the tube.

Familiar Name.	*Scientific Name.*	*Description.*
1. Urn-shaped.	Urceolate.	Having the tube swollen in the middle and nearly closed at the top.
2. Trumpet-shaped.	Tubular.	Having the tube long and resembling a common trumpet.
3. Bell-shaped.	Campanulate.	Having the tube wide and spreading out like a bell.
4. Funnel-shaped.	Infundibular.	Having the tube spreading outward gradually toward the border.
5. Salver-shaped.	Hypocrateriform.	Having the tube long, and the border very flat and spreading.
6. Wheel-shaped.	Rotate.	Having the tube short, and the border divided, somewhat like the spokes of a wheel.
7. Lip. *a.* open. *b.* closed. *c.* arched.	Labiate. *a.* ringent. *b.* personate. *c.* galeate.	Having the tube spreading, and divided at the border into two parts, resembling the lips of an animal. *a.* lips open or grinning. *b.* lips closed or masked. *c.* upper lip curved.

1.

Urn-shaped.

(*Urceolate.*)

Huckleberry.
Blue bilberry.
Checkerberry.
Heath (species of).
Andromeda.
Mt. cranberry.
Blueberry.

2.

Trumpet-shaped.

(*Tubular.*)

Honeysuckle.
Trumpet-creeper.
Foxglove.
Comfrey.
Bouvardia.
Mertensia.
Cuphæa.

3.

Bell-shaped.

(*Campanulate.*)

Harebell.
Canterbury-bell.
Bellwort.
Forsythia.
Lily-of-the-valley.
Hyacinth.
Tulip-tree.

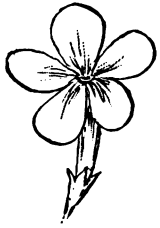
4.

Funnel-shaped.

(*Infundibular.*)

Morning-glory.
Petunia.
Azalea.
Tobacco blossom.
Sweet-potato blossom.
Field bindweed.
Tuberose.

SHAPES OF FLOWERS. — *Continued.*



5.

Salver-shaped.

(*Hypocrateriform.*)

Phlox.
Lilac.
Heliotrope.
Forget-me-not.
Verbena.
Jessamine.
Primrose.
Abronia (calyx).

6.

Wheel-shaped.

(*Rotate.*)

Tomato.
Mullein.
Speedwell.
Bittersweet.
Egg-plant.
Jerusalem cherry.
Potato.
Nightshade.

7 *a*.

Open-lipped.

(*Ringent.*)

Mint.
Sage.
Catnip.
Hemp-nettle.
Monkey-flower.
Scarlet salvia.
Mt. balm.
Wild sage.

7 *b*.

Closed-lipped.

(*Personate.*)

Snap-dragon.
Butter-and-eggs.

7.

Arch-lipped.

(*Galeate.*)

Henbit.
Dead-nettle.

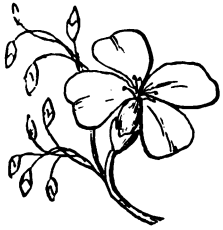
II.

MANY-LEAVED FLOWERS. (Polypetalous Corollas.)

PARTS. — Flower-leaves, or petals.

PARTS OF A PETAL. — { Stem-part, or claw. / Blade, or lamina.

Familiar Name.	*Scientific Name.*	*Description.*
1. Cross-shaped.	Cruciferous.	Having four petals, arranged in the form of a cross.
2. Pink-shaped.	Caryophyllaceous.	Having five petals, each having a spreading blade and a long, slender claw.
3. Rose-shaped.	Rosaceous.	Having five petals, each having a broad, spreading blade and a short claw.
4. Lily-shaped.	Liliaceous.	Having six petals spreading outward like a bell.
5. Butterfly-shaped.	Papilionaceous.	Having five petals, one called a *banner*, two called *wings*, and two, partly united, called a *keel*.
6. Irregular.	Anomalous.	Of a shape not easy to be described.



1. ***Cross-shaped.***
(*Cruciferous.*)

Cress.
Cabbage.
Mustard.
Radish.
Candytuft.
Wall-flower.
Sweet alyssum.

2. ***Pink-shaped.***
(*Caryophyllaceous.*)

Pink.
Mullein pink.
Scarlet lychnis.
Ragged Robin.
Soapwort, or
Bouncing Bet.
Royal catchfly.

3. ***Rose-shaped.***
(*Rosaceous.*)

Wild rose.
Sweet brier.
Apple blossom.
Peach blossom.
Pear blossom.
Plum blossom.
Quince blossom.
Strawberry blossom.
Cherry blossom.
Apricot blossom.
Beech blossom.
Blackberry blossom.
Raspberry blossom.
Pyrus japonica.

4. ***Lily-shaped.***
(*Liliaceous.*)

White lily.
Japan lily.
Tiger lily.
Yellow lily.
Philadelphia lily.
Dogtooth violet.
Amaryllis.

5. ***Butterfly-shaped.***
(*Papilionaceous.*)

Sweet pea.
Pole bean.
Lima bean.
Rose acacia.
Locust.
Everlasting pea.
Wistaria.

6. ***Irregular-shaped.***
(*Anomalous.*)

Columbine.
Nasturtium.
Larkspur.
Balsam.
Horse-chestnut.
Begonia.
Squirrel-corn.
Violet.
Pansy.
Foxglove.
Lady-in-green.
Cyclamen.
Cleome.
Jewel-weed.
Poppy.
Kalmia.
Buttercup.
Dicentra.
Passion flower.
Geranium.
Orchids.

7. ***Non-petalled.***
(*Apetalous.*)

Buckwheat.
Calla.
Jack-in-the-pulpit.
Wild calla.
Pigweed.
Four-o'clock.
Wild ginger.

8. ***Three-petalled.***
(*Three-petalled.*)

Spiderwort.
Arrowhead.
Orchids.
Blue flag.
Gladiolus.
Tiger flower.
Wake-robin.

9. ***Four-petalled.***
(*Four-petalled.*)

Fuchsia.
Poppy.
Eschscholtzia.
Evening primrose.
Water target.
Dogwood.
Witch-hazel.

III.

COMPOSITE FLOWERS. (Compositæ.)

DISK FLORETS. — Florets in the centre of the flower.
RAY FLORETS. — Florets around the outer edge of the flower.

Familiar Name.	*Scientific Name.*	*Description.*
1. Disk-faced.	Discoid.	Having all the florets tube-shaped (*tubular*).
2. Ray-faced.	Radiant.	Having all the florets strap-shaped (*ligulate*).
3. Ray-and-disk-faced.	Radiate.	Having all the disk florets tube-shaped (*tubular*), and all the ray florets strap-shaped (*ligulate*).

1.

Disk-faced.

(*Discoid.*)

Thistle.	Tassel flower.
Burdock.	Boneset.
Artichoke.	Blue-bottle.
Canada thistle.	Tansy.
Ragweed.	Ironweed.
Everlasting.	Trumpetweed.
Ageratum.	Southern wood.

3.

Ray-and-Disk-faced.

(*Radiate.*)

Dusty miller.	Yarrow.	Marigold.
Golden rod.	Arnica.	Dahlia.
China aster.	Gaillardia.	Coreopsis.
Daisy.	Elecampane.	Sunflower.
Chamomile.	Mayweed.	Ox-eyed daisy.
Chrysanthemum.	Feverfew.	Rosin-plant.
Colt's-foot.	Zinnia.	Ox-eye.

2.

Ray-faced.

(*Radiant.*)

Dandelion.	Hawkbit.
Lettuce.	Wild lettuce.
Sow-thistle.	Endive.
Hawkweed.	Dwarf dandelion.
Chicory.	Mulgedium.
Rattlesnake root.	White lettuce.
Oyster plant.	Rough sow-thistle.

THE FRUIT.

Familiar Name.	*Scientific Name.*	*Description.*
Fruit.	Fruit.	The ripened ovary with all its contents.
Skin or shell.	Pericarp.[1]	The outside coat of a fruit. (See the skin of a peach, or the outside of a pea-pod.)
Pulp.	Mesocarp.	The middle coat of a fruit. (See the pulp of a peach.)
Inner skin, or membrane.	Endocarp.	The inside coat of a fruit. (See the shell of a peach pit, or the inside of a pea-pod.)
Seed, or plant-egg.	Kernel.	The parts within the coats of a fruit; the seed.
Husks or pod.	Valves.	Pieces of the pericarp. (See the parts of a pea-pod.)
Seams.	Sutures.	The lines which show where valves are united.
Partitions.	Dissepiments.	Membranes which divide the pericarp into cells.
Column.	Columella.	The central part where the portions are united.
Cells.	Cells.	Divisions made by the partitions inside of the pericarp.

[1] Also named *Exocarp.*

FORMS OF FRUIT.

	Familiar Name.	Scientific Name.	Description.
Fleshy fruits.	1. Berry.	Bacca.	A soft, juicy pericarp containing seed in its pulp.
	2. Apple-like.	Pome.	A soft, juicy pericarp containing cells which hold the seeds.
	3. Gourd-like.	Pepo.	A hard-rinded, one-celled fruit more or less filled with pulp, which contains the seed.
Stone fruits.	4. Peach-like.	Drupe.	A soft, juicy pericarp and mesocarp covering a hard, bony pericarp which contains the seed.
	5. Walnut-like.	Tryma.	A somewhat soft pericarp covering a hard, bony endocarp, which contains the seed.
	A. Not opening to discharge the seed when ripe. (*Indehiscent.*)		
A. Dry fruits.	6. Seed-like.	Achenium.	A dry pericarp containing one seed, from which it may be separated.
	7. Bladder-like.	Utricle.	A thin, bladder-like pericarp, resembling an achenium.
	8. Grain-like.	Caryopsis.	A dry pericarp containing one seed, from which it cannot be separated.
	9. Hard-shelled.	Nut, or Glans.	A hard, one-celled, one-seeded fruit.
	10. Winged or key-fruit.	Samara.	A fruit having a winged apex or margin.
	B. Opening to discharge the seed when ripe. (*Dehiscent.*)		
B. Dry fruits.	11. Bag-like pod.	Follicle.	A one-valved, one-celled seed-vessel which opens on one side only.
	12. Two-pieced pod.	Legume.	A long, narrow, two-valved, one-celled seed-vessel in which the seeds are attached to only one edge or seam.
	13. Casket-like.	Capsule.	A dry seed-vessel which splits or bursts open when the seeds are ripe.
	14. Two-celled pod.	Silique.	A long, narrow, two-valved, two-celled seed-vessel in which the seeds are attached alternately to both edges or seams.
	15. Little silique.	Silicle.	A short, broad silique.
	16. Box-like.	Pyxis.	A capsule which opens like a box with a lid.
Multiple fruit.	17. Cone.	Strobile.	A fruit composed of woody scales which bear one or more naked seeds. — Pine.
	18. Heap-like.	Sorosis.	A fruit formed from many flowers united together. — Pineapple.
	19. Fig-like.	Syconus.	A fruit formed from many flowers united together. — Fig.
Aggregate fruit.	20. United-fruit.	Etærio.	Many achenia or small drupes joined together on one receptacle. — Strawberry, sunflower, blackberry, raspberry.
Accessory fruit.			Fruit in which the fleshy portion belongs to some other part of the flower than the ovary. — Strawberry, checkerberry, and rose-hip.

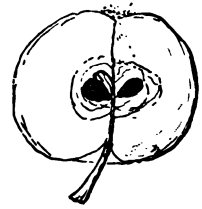
EXAMPLES OF FRUIT.

1.

Berry.

(*Bacca.*)

Currant.
Gooseberry.
Huckleberry.
Cranberry.
Grape.
Tomato.
Egg plant.
Orange.
Lemon.
Shaddock.
Citron.
Holly.
Lime.
Blueberry.
Wintergreen.
Persimmons.
Banana.
Pomegranate.
Passion flower.
Potato.
Jerusalem cherry.
Elder.
English ivy.
Bittersweet.

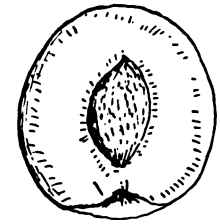


2.

Apple-like.

(*Pome.*)

Apple.
Pear.
Quince.
Crab-apple.
Choke berry.
Shad berry.
Mountain ash.
Hawthorn.
Cockspur thorn.
Summer haw.
Black thorn.
Loquat-tree.



4.

Peach-like.

(*Drupe.*)

Peach.
Nectarine.
Apricot.
Damson plum.
Red cherry.
Beach plum.
Ox-heart cherry.
Dogwood.
Hobblebush.
Yellow plum.
Wild cherry.
Bearberry.
Holly.
Yellow plum.
Gum tree.
Oil nut.
Cranberry tree.

5.

Walnut-like.

(*Tryma.*)

Walnut.
Butternut.
Cocoanut.

3.

Gourd-like.

(*Pepo.*)

Cucumber.
Musk melon.
Pumpkin.
Watermelon.
Bottle gourd.
Colocynthe.
Egg squash.
Balsam apple.
Winter squash.
Prickly cucumber.
Mock orange.

6.

Seed-like.

(*Achenium.*)

Aster.
Sunflower.
Dandelion.
Golden rod.
Daisy.
Marigold.
Yarrow.
Succory.
Lettuce.
Thistle.
Chrysanthemum.
Strawberry.[1]
Buttercup.
Rhubarb.
Buckwheat.
Calycanthus.
Yellow dock.
Forget-me-not.
Arnica.
Cinque-foil.
Chamomile.
Feverfew.

7.

Bladder-like.

(*Utricle.*)

Thrift.
Cockscomb.
Spinach.
Samphire.
Four-o'clock.
Marsh rosemary.
Prince's feather.
Wormseed.
Pigweed.
Water hemp.
Golden orache.

8.

Grain-like.

(*Caryopsis.*)

Wheat.
Rye.
Carex.
Rice.
Indian corn.
Timothy grass.
Oats.
Barley.
Spear grass.
Orchard grass.
Most grasses.

[1] The seed-like parts on the strawberry are the fruit.

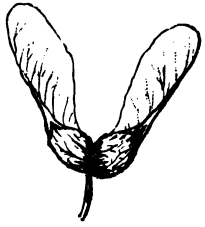
EXAMPLES OF FRUIT. — *Continued.*

9.

Hard-shelled.

(*Nut.*)

Chestnut.
Beech.
Oak.
Hazel.
Almond.
Filbert.
Hickory.
Hop hornbeam.
Flowering almond.
Sweet fern.
Brazil nut.



10.

Key-fruit.

(*Samara.*)

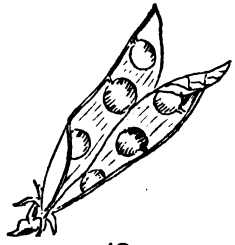
Birch.
Elm.
Black ash.
Red maple.
Ailanthus.
Sugar maple.
White ash.
Sycamore.
Red ash.
Whistle-wood.
Slippery elm.

11.

Bag-like.

(*Follicle.*)

Peony.
Columbine.
Larkspur.
Spiræa.
Oleander.
Marsh marigold.
Meadow sweet.
Periwinkle.
Pride-of-the-meadow.
Indian hemp.
Milkweed.



12.

Two-pieced Pod.

(*Legume.*)[1]

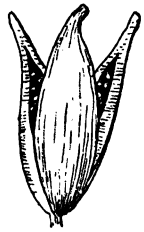
Garden pea.
Tare.
Windsor bean.
Lupin.
Everlasting pea.
Lima bean.
Wistaria.
String bean.
Locust tree.
Coffee tree.
Laburnum.

14.

Two-celled Pod.

(*Silique.*)

Mustard.
Wall flower.
Stock.
Cabbage.
Watercress.
Hedge mustard.
Radish.
Rocket.
Turnip.
Toothwort.
Winter cress.

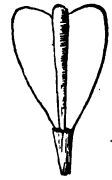


15.

Casket.

(*Capsule.*)

Pink. Lilac.	Witch hazel.
Poppy. Flax.	Hydrangea.
Morning-glory.	Fuchsia.
Iris. Phlox.	Balloon-vine.
Lily. Balsam.	Sweet potato.
Thorn apple.	Red pepper.
Mignonette.	Catalpa.
Ragged Robin.	Mullein.
Geranium.	Mock orange.
Nasturtium.	Spring beauty.
Holyhock.	Cotton plant.



16.

Little Silique.

(*Silicle.*)[2]

Pepper grass.
Shepherd's purse.
Candytuft.
Horse radish.
Sweet alyssum.
Honesty.
Whitlow grass.
Pennycress.
False flax.
Marsh cress.
Dyer's wood.

16.

Box-like.

(*Pyxis.*)

Purslane.
Scarlet pimpernel.
Heart-leaved plantain.
Henbane.
Amaranth.
Portulacca.
White cockscomb.
Common plantain.
Globe amaranth.
Hoary plantain.
Lance-leaved plantain.

17.

Cone.

(*Strobile.*)

Hop.
Larch.
Cypress.
Fir.
Arbor vitæ.
Pitch pine.
Yellow pine.
Hemlock spruce.
Norway spruce.
Red pine.
White pine.

[1] Peculiar to plants having butterfly-shaped *(Papilionaceous)* corollas.

[2] Peculiar to plants having cross-shaped *(Cruciferous)* corollas.

THE SEED.

Familiar Name.	*Scientific Name.*	*Description.*
Outer seed-coat.	Outer integument, or testa.	The outside covering of the seed. (See the coats of a Lima bean.)
Inner seed-coat.	Inner integument, or tegmen.	The thin inside covering of the seed.
False coat.	Aril, or arillus.	A substance which surrounds the seed of some plants.
Scar.	Hilum.	The mark where the seed separated from the seed-stalk.
Opening.	Micropyle.	The opening in the seed-coats.
Kernel.	Nucleus.	The seed within the coats.
Germ, or chit.	Embryo.	The part of the seed which is the new plant.
White part.	Albumen.	The part of the seed prepared for the embryo to feed upon.

PARTS OF THE EMBRYO.

Rootlet.	Radicle.	The root-end of the embryo.
Seed-leaves.	Cotyledons.	The seed-leaves which nourish the plantlet till other parts are formed.
Leaf-bud, or stem.	Plumule.	The top or bud-end of the embryo.

EXAMPLES.

False-coated Seeds.	*Having Albumen.*	*Without Albumen.*	*Having one Seed-leaf.*	*Having two Seed-leaves.*	*Having more than two Seed-leaves.*
(*Arilled seeds.*)	(*Albuminous.*)	(*Exalbuminous.*)	(*Monocotyledonous.*)	(*Dicotyledonous.*)	(*Polycotyledonous.*)
Milkweed (hairy tuft).	Rye.	Maple.	Iris.	Maple.	Gray pine. 4 or 5.
Cotton plant (cotton wool).	Barley.	Pumpkin.	Lily-of-the-valley.	Rose.	Pitch pine. 5.
Trumpet creeper (wing).	Wheat.	Almond.	Grasses.	Bean.	Yellow pine. 5 to 7.
Catalpa (fringe).	Corn.	Plum.	Palmetto.	Pea.	Red pine. 6 or 7.
Pines (wing).	Buckwheat.	Apple.	Palm.	Apple.	Loblolly pine. 5 to 8.
Strawberry (pulp).	Poppy.	Beech.	Calla.	Orange.	White pine. 8 to 10.
Waxwork (pulp).	Cocoanut.	Bean.	Crocus.	Pumpkin.	Black spruce.
White water-lily (bag).	Barberry.	Pea.	Onion.	Morning-glory.	Hemlock spruce.
Nutmeg (mace).	Coffee.	Chestnut.	Smilax.	Honeysuckle.	Balsam fir.
Spindle-tree.	Ivory nut.	Acorn.	Corn.	Forget-me-not.	White cedar.
Willow (silky hair).	Four-o'clock.	Sassafras.	Jack-in-the-pulpit.	Most forest trees.	Bald cypress.

FACTS ABOUT SEEDS.

The *ripe pollen of the stamen* falls upon the pistil of a flower, and is conveyed down the pistil into the ovary to begin the new seed.

The *seed-vessel* protects the young seeds while they are becoming ripe.

The *seed-coats* protect the seeds, especially after they ripen and fall from the parent-plant.

The *albumen* nourishes the plantlet until it can take food from the ground and air.

Some seeds have no albumen; these have their food stored in the seed-leaf or cotyledon.

The *radical* always turns downward to seek darkness.
The *plumule* always grows toward the light and air.

Some seeds have but one cotyledon.
Some seeds have two cotyledons.
Some seeds have more than two cotyledons.
Some seeds have no cotyledons.

The seed-like parts of the flowerless plants, as ferns, mosses, etc., are called *spores*.

Sporange is the name given to a kind of case in which spores are contained.

Two or more of these are called *sporangia*, or *thecæ*.

The clusters of spores on fern fronds are called *sori*.

PART III.

OUTLINE LESSONS

OF

BOTANICAL TERMS USED MOST FREQUENTLY IN THE DESCRIPTION AND CLASSIFICATION OF PLANTS.

ALSO,

A SHORT HISTORY OF BOTANY.

ROOTS.

PARTS.
- Neck.
- Main, or tap root.
- Branches.
- Rootlets.
- Root-tips.
- Root-hairs.

KINDS.

As to Origin.	*As to Situation.*	*As to Duration.*
Primary.	Terrestrial.	Annual.
Secondary.	Aquatic.	Biennial.
	Aërial.	Perennial.

SHAPES OF ROOTS.

Annual Roots.

Thread-like (*Fibrous*).
Necklace-like (*Moniliform*).
Bundle-like (*Fasciculated*).

Biennial Roots.

Tuberous (*Tuberous*).
Cone-shaped (*Conical*).
Bitten off (*Premorse*).
Spindle-shaped (*Fusiform*).
Turnip-shaped (*Napiform*).

Perennial Roots.

Branching (*Ramose*).
Creeping (*Repent*).
Rootstock (*Rhizoma*).
Tubers (*Tubercular*).
Corn. Bulb.

STEMS.

PARTS. { Nodes. Internodes. Leaf axils.

Appendages.	*Attitudes.*	*Stems above Ground.*
Terminal buds.	Erect.	Sucker.
Axillary buds.	Spreading.	Stolon.
Branches.	Drooping.	Offshoot.
Leaves.	Ascending.	Runner.
Flowers.	Climbing.	Tendril.
Tendrils.	Twining.	Thorn.
Thorns.	Prostrate.	Scape.
Prickles, or spines.	Trailing.	Grass-stem.
Glands.	Creeping.	Palm-stem.
Stings. Hairs.	Underground.	Trunk.

Size.	*Color.*	*Surface.*	*Shape.*	*Structure.*
Long.	Brown.	Smooth.	Rounded.	Solid.
Short.	Green.	Rough.	Half-rounded.	Hollow.
Slender.	Purple.	Hairy.	Three-sided.	Soft and
Thick.	Red.	Sticky.	Four-sided.	Brittle.
High.	Spotted.	Glossy.	Furrowed.	Hard and
Low.	Striped.	Dull.	Flattened.	Tough.

Duration.	*Kinds as to Growth.*	*Parts of Outside-growing Stem.*
Annual.	Outside-growing (*Exogenous*).	Bark. Wood.
Biennial.	Inside-growing (*Endogenous*).	Silver grain.
Perennial.	End-growing (*Acrogenous*).	Pith.

BUDS.

Parts.
- Outer scales.
- Downy substance.
- Gummy substance.
- Young leaf or flower.

Kinds of Buds.

Leaf-bud.
Flower-bud.

Leaf-bud Arrangement.

Flat (*Flat*).
Folded down (*Inflexed*).
Folded together (*Conduplicate*).
Fan-like (*Plicate* or *plaited*).
Straddling (*Equitant*).
Rolled inward (*Involute*).
Rolled outward (*Revolute*).
Rolled around (*Obvolute*).
Half-rolled (*Convolute*).
Crosier-like (*Circinate*).
Edges meeting (*Valvate*).
Triangle-like (*Triquetrous*).

Flower-bud Arrangement.

Open (*Open*).
Edges meeting (*Valvate*).
Turned inward (*Induplicate*).
Turned outward (*Reduplicate*).
Shingled (*Imbricate*).
Alternate (*Alternate*).
Five-ranked (*Quinuncial*).
Banner-covered (*Vexillary*).
Rolled (*Convolute*).
Twisted (*Contorted*).
Plaited (*Plicate*).
Rolled and twisted (*Supervolute*).

LEAVES:

MAY BE

NET-VEINED . .	1. Feather-veined (*Pinnately-veined*).	Rose, oak, lilac.
	2. Palmately-veined (*Radiate-veined*).	Sweet gum, maple.
PARALLEL-VEINED . .	1. Straight-veined.	Grasses.
	2. Curved-veined.	Orchis.
	3. Transverse-veined.	Canna, calla.
FORK-VEINED, or furcate-veined.		Ferns.

MAY BE

PETIOLATE, having a stem.	Maple, geranium, grape.
SESSILE, without a stem.	Sumach, forget-me-not.
STIPULATE, having stipules.	Pea, rose, clover.
EXSTIPULATE, having no stipules.	Lilac, morning-glory, lily.

MAY BE

SIMPLE, having only one blade.	Lilac, grape, daisy.
COMPOUND, having more than one blade.	Rose, wistaria, ailanthus.

PARTS

Of Simple Leaves.			*Of Compound Leaves.*
Blade.		Blade.	Leaflets.
Petiole.	or	Sheath.	Rachis.
Stipules. Free. Adnate. Prickly. Ochreate.		Ligule.	Petiolules. Stipules.

COMPOUND LEAVES.

MAY BE

Feathered (Pinnate).	*Palmate or Digitate.*
Equally-feathered (*Equally pinnate*).	Three-fingered (*Tridigitate*).
Unequally-feathered (*Unequally pinnate*).	Five-fingered.
Curled-feathered (*Cirrhose pinnate*).	Seven-fingered.
Interruptedly-feathered (*Interruptedly pinnate*).	Twice-three-fingered.
	Thrice-three-fingered.
Twice-feathered (*Bipinnate*).	More than twice-three-fingered, *i.e.*, Decompound.
Thrice-feathered (*Tripinnate*).	
More than thrice-feathered (*Decompound*).	

VARIETIES IN PARTS OF THE BLADE.

Bases.

Heart-shaped (*Cordate*).
Kidney-shaped (*Reniform*).
Ear-shaped (*Auriculate*).
Spear-shaped (*Hastate*).
Arrow-shaped (*Sagittate*).
Down-running (*Decurrent*).
Stem-clasping (*Amplexicaul*).
Perforated (*Connate*).
Slanting (*Oblique*).
Tapering (*Acuminate*).

Apexes.

Sharp (*Acute*).
Tapering (*Acuminate*).
Blunt (*Obtuse*).
Cut-off (*Truncate*).
Turned-in (*Retuse*).
Heart-shaped (*Obcordate*).
Notched (*Emarginate*).
Stiff-pointed (*Mucronate*).
Abruptly-pointed (*Cuspidate*).

Margins.

Plain. (*Entire.*)
Toothed. (*Dentate.*)
Finely-toothed. (*Denticulate.*)
Coarsely-toothed. (*Coarsely dentate.*)
Evenly-toothed. (*Evenly dentate.*)
Unevenly-toothed. (*Unevenly dentate.*)
Doubly-toothed. (*Doubly dentate.*)
Bitten-toothed. (*Erose dentate.*)
Wavy. (*Repand.*)
Wavy. (*Undulate.*)

Saw-toothed. (*Serrate.*)
Finely saw-toothed. (*Serrulate.*)
Coarsely saw-toothed. (*Coarsely serrate.*)
Evenly saw-toothed. (*Evenly serrate.*)
Unevenly saw-toothed. (*Unevenly serrate.*)
Doubly saw-toothed. (*Doubly serrate.*)
Scalloped. (*Crenate.*)
Finely-scalloped. (*Crenulate.*)
Coarsely-scalloped. (*Coarsely crenate.*)
Evenly-scalloped. (*Evenly crenate.*)

Unevenly-scalloped. (*Unevenly crenate.*)
Doubly-scalloped. (*Doubly crenate.*)
Frilled.
Palmately- { Lobed. / Cleft. / Parted. / Divided.
Feather- or Pinnately- { Lobed. / Cleft. / Parted. / Divided.
Slightly wavy. (*Sub-repand.*)
Scalloped saw-toothed, or (*Serrate-crenate*), etc.

Surfaces.

Smooth (*Glabrous*).
Sticky (*Viscid*).
Hairy (*Pilose*).
Downy (*Pubescent*).
Velvety (*Villose*).
Wooly (*Lanuginous*).
Felt-like (*Tomentose*).
Stiff-haired (*Hispid*).
Bristly (*Setose*).
Rough (*Scabrous*).
Silky (*Sericeous*).
Cobwebby (*Arachnoid*).

SHAPES OF LEAVES.

Broadest

In the Middle.	*At the Base.*
Round or Circular (*Orbicular*).	Delta-shaped (*Deltoid*).
Ellipse-shaped (*Elliptical*).	Egg-shaped (*Ovate*).
Oval (*Oval*).	Lance-shaped (*Lanceolate*).
Oblong (*Oblong*).	Awl-shaped (*Subulate*).
Line-shaped (*Linear*).	Heart-shaped (*Cordate*).
Needle-shaped (*Acicular*).	Spear-shaped (*Hastate*).
	Arrow-shaped (*Sagittate*).

At the Apex.

Inversely ovate (*Obovate*).[1]
Inversely heart-shaped (*Obcordate*).
Inversely lance-shaped (*Oblanceolate*).
Spatula-shaped (*Spatulate*).
Wedge-shaped (*Cuneate*).

Miscellaneous.

Bird's-foot-shaped (*Pedate*).
Hand-shaped (*Palmate*).
Kidney-shaped (*Reniform*).
Shield-shaped (*Peltate*).
Lyre-shaped (*Lyrate*).
Down-running (*Runcinate*).
Gashed or deeply-cut (*Laciniate*).
Twice-feathered-lobed (*Bipinnatifid*).

Lobed Leaves

have Lobes and Sinuses.

Lobes.	*Sinuses.*
Rounded.	Open.
Acute.	Shut.
Broad.	Sharp.
	Sharp and deep.
	Broad, round, and shallow

[1] *Ob* means *inversely*; as, Obovate, *inversely* ovate.

INFLORESCENCE.

Simple.
Compound.

PARTS

Of Simple Inflorescence.	*Of Compound Inflorescence.*
Peduncle.	Rachis.
Bract.	Pedicel.
Involucre.	Bractlet.
Receptacle.	Involucel.

Position.	*Kinds.*	*Attitude.*
At the end of a stem (*Terminal*).	Stem-ending (*Definite*).	Erect. Nodding.
In the axil of a leaf (*Axillary*).	Not stem-ending (*Indefinite*).	Drooping.

VARIETIES

Of Axillary Inflorescence.			*Of Terminal Inflorescence.*
1. *Flowers on Pedicels.*	2. *Flowers Sessile.*	3. *Compound.*	1. *Cymes.*
Raceme.	Spike.	Compound raceme.	Cyme. Fascicle.
Corymb.	Spadix.	Compound corymb.	Glomerule.
Umbel.	Ament, or catkin.	Compound umbel.	Whorl.
	Head.	Thyrse.	Scorpoid cyme.

THE BLOSSOM, OR FLOWER.

ESSENTIAL ORGANS, *the Stamens and the Pistils.*
FLORAL ENVELOPES, *the Calyx and the Corolla.*

PARTS OF A BLOSSOM, OR FLOWER.

Calyx.	Pistil.	When both calyx and corolla are of the same color they form the "Perianth."
Sepals.	Style.	
Corolla.	Stigma.	
Petals.	Ovary.	
Stamen.	Peduncle.	
Filament.	Receptacle.	
Anther.	(In some flowers, a *spur*, or a *nectary*.)	
Pollen.		

DEFINITIONS.

A. { Complete flowers have four sets of organs, — calyx, corolla, stamens, and pistils.
Incomplete flowers lack one or more of these sets of organs.

B. { Perfect flowers have both stamens or pistils.
Imperfect flowers lack either stamens or pistils.

C. { Regular flowers have all the parts of each set alike in shape and size.
Irregular flowers do not have all the parts of each set alike.

D. { Symmetrical flowers have an equal number of parts in each set of organs.
Unsymmetrical flowers do not have an equal number of parts in each set of organs.

COMPLETE FLOWERS.

Complete flowers may be regular or irregular; symmetrical or unsymmetrical.

INCOMPLETE FLOWERS.

Some have no corolla; these are	called *apetalous* flowers.
Some have neither calyx nor corolla;	called *naked* flowers.
Some have no stamens;	called *imperfect* flowers.
Some have no pistils;	called *imperfect* flowers.
Some have neither stamen nor pistils;	called *neutral* flowers.

PERFECT FLOWERS.

All complete flowers are perfect flowers.
Those incomplete flowers which have stamens and pistils are perfect flowers.

IMPERFECT FLOWERS.

Those which have stamens but no pistils are called *staminate* or *sterile* flowers.
Those which have pistils but no stamens are called *pistillate* or *fertile* flowers.

TYPICAL FLOWERS.

A typical flower, or *pattern flower*, is one which is perfect, complete, regular, symmetrical, and simple; as, flax, stonecrop.

EXAMPLES OF COMPLETE FLOWERS, Etc.

Complete.	*Regular.*	*Irregular.*	*Symmetrical.*
Rose.	Stonecrop.	Pansy.	Magnolia.
Pink.	Rose.	Bean.	Buttercup.
Pansy.	Catchfly.	Larkspur.	Trillium.
Lilac.	Water lily.	Sage.	Evening primrose.
Bean.	Oxalis.	Foxglove.	Houseleek.
Morning-glory.	Flax.	Radish.	Live-for-ever.
Fuchsia.	Pink.	Nasturtium.	Clarkia.

Unsymmetrical.	*Neutral.*
Larkspur.	Hydrangea.
Portulacca.	Snowball.
Horse chestnut.	Double roses.
Pink.	Double pinks.
Radish.	Double dahlias.
Mustard.	Double petunias.
Bleeding-heart.	Etc., etc.

INCOMPLETE FLOWERS.		IMPERFECT FLOWERS.	
Apetalous.	*Naked.*	*Staminate, or Sterile.*	*Pistillate, or Fertile.*
		Some —	Some —
Four-o'clock.	Buttonwood.	Ailanthus blossoms.	Ailanthus blossoms.
Buckwheat.	Indian turnip.	Willow blossoms.	Willow blossoms.
Castor-oil plant.	Lizard's-tail.	Poplar blossoms.	Poplar blossoms.
Anemone.	Willows.	Chestnut blossoms.	Chestnut blossoms.
Sassafras.	Cat-tail.	Oak blossoms.	Oak blossoms.
Marsh marigold.	Sweet flag.	Hemp blossoms.	Hemp blossoms.
Cuphea.	Calla.	Tassel of Indian corn.	Silk of Indian corn.

DURATION OF PARTS OF A FLOWER.

Caducous, falling early (before the flower opens fully). — Poppy calyx, grape corolla.

Deciduous, falling before the fruit is ripe. — Most flowers.

Persistent, remaining after the fruit ripens. — Apple, strawberry.

SHAPES OF PARTS.

The same terms are employed to describe the shapes of the parts of the calyx, corolla, stamens, and pistils, as are used in the description of Leaves.

THE CALYX AND COROLLA.

CALYX . . . . The outer circle of flower-leaves.
COROLLA . . . The inner circle of flower-leaves.

KINDS OF CALYX, Etc.

The Calyx is . . . { Polysepalous when it has more than one sepal. / Gamosepalous when it has only one sepal.
The Corolla is . . { Polypetalous when it has more than one petal. / Gamopetalous when it has only one petal.
The Perianth is . . { Polyphyllous when it has more than one part. / Gamophyllous when it has only one part.

COROLLAS

are { Regular[1] or / Irregular.[2]

GAMOPETALOUS COROLLAS.[3]

PARTS . . { Tube. / Limb or border. { Narrow. / Broad or / Spreading. / Throat. { Open or constricted; / hairy or smooth.

Regular.	*Irregular.*
Urn-shaped (*Urceolate*).	Lip-shaped (*Labiate*) { Personate. / Ringent. / Arched.
Tube-shaped (*Tubular*).	
Bell-shaped (*Campanulate*).	
Funnel-shaped (*Infundibuliform*).	Strap-shaped (*Ligulate*).
Salver-shaped (*Hypocrateriform*).	Anomalous.
Wheel-shaped (*Rotate*).	

POLYPETALOUS COROLLAS.

PARTS . . . . { Blade. / Claw.

Regular.	*Irregular.*
Cross-shaped (*Cruciferous*).	Butterfly-shaped (*Papilionaceous*).
Pink-shaped (*Caryophyllaceous*).	Anomalous.
Rose-shaped (*Rosaceous*).	
Lily-shaped (*Liliaceous*).	

[1] A regular calyx, corolla, or perianth has its parts of the same size and shape.
[2] An irregular calyx, corolla, or perianth has its parts unlike in size or in shape.
[3] The same as monopetalous corollas.

STAMENS.

PARTS . . . . { Filament. Anther. Pollen.

Number of Stamens.

One stamen (*Monandrous*).
Two stamens (*Diandrous*).
Three stamens (*Triandrous*).
Four stamens (*Tetrandrous*).
Five stamens (*Pentandrous*).
Six stamens (*Hexandrous*).
Seven stamens (*Heptandrous*).
Eight stamens (*Octandrous*).
Nine stamens (*Nonandrous*).
Ten stamens (*Decandrous*).
Eleven stamens (*Enneandrous*).
Twelve stamens (*Duodecandrous*).
More than twelve stamens inserted on the receptacle (*Polyandrous*).
More than twelve stamens inserted on the calyx (*Icosandrous*).

Stamens of Unequal Length.

Two long and two short. (*Didynamous*).
Four long and two short. (*Tetradynamous*).

Stamens United to other Parts (Adnation).

Borne on the receptacle (*Hypogynous*).
Borne on the calyx (*Perigynous*).
Borne on the corolla (*Epipetalous*).
Borne on the ovary (*Epigynous*).
Borne on the style (*Gynandrous*).

Stamens United Together (Cohesion).

United by their anthers (*Syngenesious*).
United by the filaments into one set or brotherhood (*Monadelphous*).
United into two sets or brotherhoods (*Diadelphous*).
United into three sets or brotherhoods (*Tridelphous*).
United into more than three sets or brotherhoods (*Polydelphous*).

Other Characteristics.

Extending beyond the corolla (*Exserted*).
Not extending beyond the corolla (*Included*).
Anther without filament (*Sessile*).
Filament without anther (*Sterile*).
Stamens converging (*Connivant*).

KINDS OF FILAMENTS.

Hair-like (*Capillary*).
Thread-like (*Filiform*).
Awl-shaped (*Subulate*).
Flattened (*Dilate*).
Petal-like (*Petaloid*).
Toothed (*Bi-dentate*).

ANTHER.

PARTS . . { Lobes or cells (*Thecæ*).
Connective.
Valves.
Line, or point of opening (*Dehiscence*).

KINDS OF ANTHER.

As to Position.

Attached to the top of the filament (*Innate*).
Attached by its whole length to the filament (*Adnate*).
Attached near its middle (*Versatile*).
Facing the petals (*Extrorse*).
Facing the pistils (*Introrse*).

As to Opening (Dehiscence).

Opening lengthwise (*Longitudinal*).
Opening across (*Transverse*).
Opening by pores (*Porous*).
Opening by valves lifting upward (*Valvular*).

ANTHER LOBES.

As to Number of Cells.	*As to Shape.*
One-celled.	Oblong.
Two-celled.	Kidney-shaped.
Three-celled.	Arrow-shaped, etc.

POLLEN.

PARTS . . { Outer coat (*Extine*).
Inner coat (*Intine*).
Minute particles in gummy liquid (*Fovillæ*).
Masses of pollen (*Pollinia*).

PISTILS.[1]

PARTS . . { Stigma. Style. Ovary. Ovules.

Number of Pistils.

One pistil (*Monogynous*).
Two pistils (*Digynous*).
Three pistils (*Trigynous*).
Four pistils (*Tetragynous*).
Five pistils (*Pentagynous*).
Many pistils (*Polygynous*).

Kinds as to Cohesion.

1. Having but one cell, placenta, style, and stigma (*Simple pistil*).
2. Several carpels united (*Compound pistil*).

Kinds of Stigmas.

Having no style (*Sessile*).
Two-parted (*Bifid*).
Three-parted (*Trifid*).
Scroll-like (*Scrolled*).
Globe-like (*Globose*).
Deeply-divided (*Lobed*).

Kinds of Styles.

Curved like the letter S (*Sigmoid*).
Joined to the base of the ovary (*Basal*).
Joined to the side of the ovary (*Lateral*).
Joined to the end of the ovary (*Terminal*).

Shapes of Styles.

The same as those of "Filaments."

Parts of the Ovary.

Parts of a compound pistil (*Carpels*).
That which bears the seeds or ovules (*Placentæ*).
Partitions in the ovary (*True dissepiments*).
False partitions in the ovary (*False dissepiments*).
Parts within the partitions (*Cells*).
Seeds (*Ovules*).
The inner seam (*Ventral suture*).
The outer seam (*Dorsal suture*).

Position of the Ovary (Adnation).

United to the calyx (*Inferior*).
Free; above the calyx (*Superior*).

Arrangement of Placentæ (Placentation).

Ovules free in the centre of the ovary (*Free-central*).
Ovules attached to the axis of the ovary (*Axillary*).
Ovules attached to the walls of the ovary (*Parietal*).

NOTE. — For parts, etc., of ovules, see "Lessons on Seeds"; also any good work on Botany; as Gray's, Wood's, or Miss Youmans'.

[1] A simple pistil or carpel answers to the blade of a leaf folded along the midvein, with the margins united to form a case or pod which contains the seeds.

FRUIT.

(The ovary or pistil brought to perfection.)

PARTS . . { Skin, or shell (*Pericarp* or *Exocarp*).
Pulp (*Mesocarp*).
Inner skin, or membrane (*Endocarp*).
Seed, or plant-egg (*Kernel*).
Husks, or pod (*Valves*).
Seams (*Sutures*).
Partitions (*Dissepiments*).
Column (*Columella*).
Cells (*Cells*).

KINDS OF FRUIT.

Fleshy Fruits.	*Stone Fruits.*	*Dry Fruits.*[1]
Berry.	Peach-kind.	Seed-like.
Apple-kind.	Walnut-like.	Bladder-like.
Gourd-kind.		Grain-like.
		Nut. Key-fruit.

Dry Fruits.[2]	*Multiple Fruits, Etc.*
Bag-like.	Cone.
Legume.	Pine-apple-kind.
Capsule.	Fig-like.
Silique.	Etærio.
Box-like.	Accessory.

NOTES.

In the apple we eat the *calyx*, which adheres to the ovary.
In the strawberry we eat the enlarged pulpy *receptacle*. The seed is the *fruit*.
In the peach we eat the *outer* coat of the ovary.
In the orange we eat the *inner* coat of the ovary.

[1] Which do not open to discharge their seed.
[2] Which open to discharge their seed.

SEEDS.

PARTS . . { Coats.
Nucleus, or kernel.

Coats.	*On Coats.*	*Parts of Nucleus.*
Outer coat (*Testa*).	Opening (*Micropyle*).	Plantlet (*Embryo*).
Inner coat (*Tegmen*).	Scar (*Hilum*).	Starchy substance (*Albumen*).
False coat (*Aril*).		

Parts of the Embryo.	*Kinds of Seeds.*	*Color of Seeds.*	*Shape of Seeds.*
Radicle, or	Monocotyledonous.	Black.	Spherical.
Root.	Dicotyledonous.	Brown.	Triangular.
Cotyledons, or	Polycotyledonous.	White.	Oblong.
Seed-leaves.	Albuminous.	Purple.	Hemispherical.
Plumule, or	Exalbuminous.	Yellow.	Ovoid.
First bud.	Arilled.	Red and black, etc.	Flat, etc.

THE VEGETABLE KINGDOM.

SUB-KINGDOM, OR SERIES.

Familiar Name.	*Scientific Name.*	*Description.*
I. Flowering plants.	Phænogamia.	Plants which have true flowers and seeds.
II. Flowerless plants.	Cryptogamia.	Plants which have no true flowers or seeds, but are produced from seed-like parts [called *spores*.

I.

Flowering Plants.

(*Phænogamia* or *Phænogams.*)

1. Have root, stem, and leaves.
2. Have wood in ring-like layers, or in thread-like bundles.
3. Have stamens and pistils, *i.e.*, true flowers.
4. Have seeds which contain the young plant, or *embryo*.

II.

Flowerless Plants.

(*Cryptogamia*, or *Cryptogams.*)

1. Seldom have root, stem, or leaf-like parts.
2. Mostly cellular.
3. Have no stamens or pistils.
4. Have spores instead of seeds.

EXAMPLES.

I.

Flowering Plants.

(*Phænogamia.*)

Buttercup.	Apple.	Poplar.	Bean.	Grass.
Morning-glory.	Grape.	Maple.	Radish.	Wheat.
Chickweed.	Currant.	Elm.	Potato.	Corn.
Water-lily.	Orange.	Hemlock.	Beet.	Sedge.
Dandelion.	Melon.	Birch.	Cabbage.	Orchis.

II.

Flowerless Plants.

(*Cryptogamia.*)

Rock-fern.	Pigeon-wheat moss.	Yeast.
Maiden-hair.	Peat-moss.	Mushroom.
Common brake.	Club-moss.	Bread-mould.
Tree-fern.	Ground pine.	Red snow.
Climbing fern.	Reindeer lichen.	Seaweed.

CLASSES.

OF FLOWERING PLANTS (Phænogamia).

Familiar Name.	*Scientific Name.*	*Description.*
I. Outside-growers.	Exogens.	Plants whose stems increase from the outside in ring-like layers of new wood next to the bark.
II. Inside-growers.	Endogens.	Plants whose stems increase from the inside in thread-like bundles of new wood scattered near the centre.

OF FLOWERLESS PLANTS (Cryptogamia).

III. Summit-growers.	Acrogens.	Plants which increase from the summit or apex only; they have stems, and leaves, and some woody fibre.
IV. Mass-growers.	Thallogens.	Plants which have their roots, stems, and leaves in one organ or mass called a *thallus*.

I.	II.	III.	IV.
Outside-growers.	***Inside-growers.***	***Summit-growers.***	***Mass-growers.***
(*Exogens*, or *dicotyledons.*)	(*Endogens*, or *monocotyledons.*)	(*Acrogens.*)	(*Thallogens.*)
Stems, outside-growing.	Stem, inside-growing.	Stem, summit-growing.	Stem, none.
Leaves, net-veined.	Leaves, parallel-veined.	Leaf-like parts, fork-veined.	Leaf-like parts, none.
Wood, in ring-like layers.	Wood, in thread-like bundles.	Woody and cellular.	Cellular only.
Flower-parts, in 5's or 4's, rarely 3's.	Flower-parts, in 3's, rarely in 5's or 4's.	Flower-parts, none.	Flower-parts, none.
Seeds, two or more cotyledons.	Seeds, one cotyledon.	Spores instead of seeds.	Spores instead of seeds.

EXAMPLES.

I.			II.			III.			IV.
Rose.	Daisy.	Currant.	Lily.	Grass.	Barley.	Scouring rush.	Maiden-hair.	Club-moss.	Lichen.
Pink.	Radish.	Apple.	Tulip.	Wheat.	Rush.	Horse-tails.	Tree-fern.	Apple-moss.	Rust. Mould.
Mint.	Cotton.	Potato.	Orchis.	Rice.	Yam.	Common brake.	Clayton's	Pigeon-wheat moss.	Mildew.
Flax.	Lilac.	Chestnut.	Onion.	Rye.	Palm.	Royal Osmund.	Osmunda.	Climbing fern.	Mushroom.
Bean.	Grape.	Willow.	Corn.	Oats.	Bamboo.	Common polypod.	Ground pine.	Liverwort.	Seaweed.

THE VEGETABLE KINGDOM. — *Continued.*

SUB-CLASSES.

CLASS I. — OUTSIDE-GROWING PLANTS (Exogens).

Familiar Name.	*Scientific Name.*	*Description.*
1. Covered-seeded plants.	Angiospermæ.	Outside-growing plants which have their seed covered by a pericarp.
2. Naked-seeded plants.	Gymnospermæ.	Outside-growing plants which have their seed naked, or on a leaf-like scale.

CLASS II. — INSIDE-GROWING PLANTS (Endogens).

1. Glumeless plants.	Aglumaceæ.	Inside-growing plants which have petals, but no husky scales or glumes.
2. Glumed plants.	Glumaceæ.	Inside-growing plants which have husky scales or glumes instead of a calyx.

I.

OUTSIDE-GROWERS (Exogens).

1. *Covered-seeded.* (*Angiospermæ.*)	2. *Naked-seeded.* (*Gymnospermæ.*)
Calyx.	Calyx, none.
Corolla, generally.	Corolla, none.
Stamens.	Stamens.
Pistils.	Pistils.
Pericarp.	Pericarp, none.
Cotyledons, two.	Cotyledons, two or more.

II.

INSIDE-GROWERS (Endogens).

1. *Glumeless.* (*Aglumaceæ.*)	2. *Glumed.* (*Glumaceæ.*)
Calyx, generally.	Calyx, none.
Corolla, generally.	Corolla, none.
Stamens.	Stamens.
Pistil.	Pistils.
Pericarp.	Pericarp.
Cotyledons, one.	Cotyledon, one.
Glumes and pales, none.	Glumes and pales.

EXAMPLES.

1.		2.		1.		2.	
Apple.	Potato.	Hemlock.	Cedar.	Lily.	Smilax.	Grass.	Maize.
Melon.	Clover.	Arbor-vitæ.	Fir.	Palm.	Tulip.	Rye.	Rice.
Violet.	Phlox.	Larch.	Spruce.	Arum.	Hyacinth.	Oat.	Barley.
Sassafras.	Beet.	Cypress.	Yew.	Onion.	Tuberose.	Wheat.	Rush.
Fuchsia.	Daisy.	Juniper.	Pine.	Orchid.	Blue-flag.	Cane.	Sedges.

DIVISIONS, OR COHORTS.

OF OUTSIDE-GROWERS (Exogens). { *A–C.* **Covered-seeded.** *D.* **Naked-seeded.**

Familiar Name.	*Scientific Name.*	*Description.*
A. Many-petalled plants.	Polypetalous division.	Outside-growing plants whose corollas have more than one petal.
B. One-petalled plants.	Monopetalous division.	Outside-growing plants whose corollas have the petals more or less united into one.
C. No-petalled plants.	Apetalous division.	Outside-growing plants which have no petals (*i.e.*, no corollas).
D. Naked-seeded plants.	Gymnosperms.	See Sub-classes, "Naked-seeded."

OF INSIDE-GROWERS (Endogens). { *E, F.* **Glumeless.** *G.* **Glumed.**

E. Spadix-bearing plants.	Spadiceous division.	Inside-growing plants whose flowers grow on a spadix.
F. Petal-bearing plants.	Petaloideous division.	Inside-growing plants whose flowers have petals, or petal-like parts.
G. Glume-bearing plants.	Glumaceous division.	See Sub-classes, "Glumed."

OUTSIDE-GROWERS (Exogens).

DIVISIONS.

A.	*B.*	*C.*	*D.*
Many-petalled Plants.	***One-petalled Plants.***	***No-petalled Plants.***	***Naked-seeded Plants.***
(*Polypetalous division.*)	(*Monopetalous division.*)	(*Apetalous division.*)	(*Gymnosperms.*)
Corolla of two or more distinct parts or petals.	Corolla-parts more or less united, forming one petal.	Only the outer circle of flower-leaves, *i.e.*, the calyx; therefore no petals, *i.e.*, no corolla.	No calyx. No corolla, only stamens and pistils, *i.e.*, true flowers.

DIVISIONS, OR COHORTS. — *Continued.*

EXAMPLES.

A.		*B.*		*C.*		*D.*	
Buttercup.	Flax.	Morning-glory.	Potato.	Four-o'clock.	Birch.	Hemlock.	Pine.
Water-lily.	Bean.	Heliotrope.	Melon.	Pigweed.	Beet.	Spruce.	Cedar.
Magnolia.	Poppy.	Forget-me-not.	Lilac.	Prince's feather.	Oak.	Juniper.	Yew.
Fuchsia.	Violet.	Petunia.	Daisy.	Sassafras.	Box.	Arbor-vitæ.	Fir.
Stone-crop.	Apple.	Honeysuckle.	Catalpa.	Buckwheat.	Willow.	Cypress.	Larch.

INSIDE-GROWERS (Endogens).

DIVISIONS.

E.

Spadix-bearing Plants.

(*Spadiceous.*)

Calyx, generally none.
Corolla, generally none.
Stamens, } forming the true flowers
Pistils, } arranged on a spadix.

F.

Petal-bearing Plants.

(*Petaloideous.*)

Calyx and Corolla, { generally of the same color, and called *perianth*.
Stamens. Pistils. No spadix.

G.

Glume-bearing, or Grass-like Plants.

(*Glumaceous division*, or *Grainmoids.*)

Calyx, none. Stamens.
Corolla, none. Pistils.
Husk-like scales instead of a calyx; sometimes an inner row of chaffy scales, called *palæ*, instead of a corolla.

EXAMPLES.

E.		*F.*		*G.*	
Egyptian calla.	Eel-grass.	Tuberose.	Onion.	Egyptian wheat.	Grass.
Jack-in-the-pulpit.	Duck-meat.	Spiderwort.	Tulip.	Quick grass.	Rice.
Sweet flag, or calamus.	Cat-tail.	Spanish moss.	Lily.	Broom corn.	Bamboo.
Skunk cabbage.	Palmetto.	Asparagus.	Smilax.	Sugar cane.	Carex.
Pond-weed.	Palms.	Century plant.	Rush.	Pampas grass.	Sedge.

SUB-CLASSES.

CLASS III. — SUMMIT-GROWING PLANTS (Acrogens).

Familiar Name.	*Scientific Name.*	*Description.*
1. Covered-spored.	Angiosporæ.	Summit-growing plants which have their spores in cases.

CLASS IV. — MASS-GROWING PLANTS (Thallogens).

2. Naked-spored.	Gymnosporæ.	Mass-growing plants which have their spores in or on the thallus.

EXAMPLES.

Class III., Sub-class I.	*Class IV., Sub-class I.*
COVERED-SPORED.	NAKED-SPORED.
Club-mosses.	Lichens.
Pipes.	Mildew.
Ferns.	Mushroom.
Mosses.	Green slime.
Liverworts.	Seaweeds.

DIVISIONS, OR COHORTS. — *Continued.*

COVERED-SPORED SUMMIT-GROWERS (Angiosporæ).

Familiar Name.	*Scientific Name.*	*Description.*
H. Spore-flowered plants.	Sporogamia.	Summit-growing plants which have stamen and pistil-like parts formed in their spores.
I. Thallus-flowered plants.	Thallogamia.	Summit-growing plants which have their spores on the surface of the thallus.
J. Axil-flowered plants.	Axogamia.	Summit-growing plants which have their spores in the axils of their leaves or buds.

NAKED-SPORED SUMMIT-GROWERS (Gymnosporæ).

K. Air-fed plants.	Aerophyta.	Mass-growing plants which grow and bear fruit in the air.
L. Decay-fed plants.	Hysterophyta.	Mass-growing plants which grow on decaying substances.
M. Water-fed plants.	Hydrophyta.	Mass-growing plants which grow and bear fruit in salt or fresh water, and in damp places.

EXAMPLES.

H.

Lycopodiaceæ	Club-moss.
	Ground-pine.
Isoetaceæ	Quillwort.
Massileaceæ	Pepperwort.

I.

Equisetaceæ	Field horse-tail.
	Scouring rush.
Filices	Fern.
	Brake.
	Polypod.

J.

Musci	Mosses.
	Marchantia.
Hepaticeæ	Jungermannia.
Characeæ	Stonewort.

K.

Lichens	Gray moss.
	Reindeer lichen.
	Iceland moss.
	Yellow-wall lichen.
	Tripe de Roche.

L.

Fungi	Mushroom.
	Bread-mould.
	Potato rot.
	Blight.
	Dry rot.

M.

Algæ	Red snow.
	Seawort.
	Gulfweed.
	Sea-aprons.
	Fresh-water weed.

A SHORTER OUTLINE SHOWING THE CLASSIFICATION OF PLANTS.

THE VEGETABLE KINGDOM.

SUB-KINGDOMS, OR SERIES.

I. FLOWERING PLANTS (*Phænogamia*).

II. FLOWERLESS PLANTS (*Cryptogamia*).

CLASSES.

Of Flowering Plants.

I. Outside-growers (*Exogens*).
II. Inside-growers (*Endogens*).

Of Flowerless Plants.

III. Summit-growers (*Acrogens*).
IV. Mass-growers (*Thallogens*).

SUB-CLASSES.

Of Outside Growers.

1. Covered-seeded plants (*Angiospermæ*).
2. Naked-seeded plants (*Gymnospermæ*).

Of Inside-growers.

1. Glumeless plants (*Aglumaceæ*).
2. Glume-bearing plants (*Glumaceæ*).

Of Summit-growers.

1. Covered-spored plants (*Angiosporæ*).

Of Thallus-growers.

1. Naked-spored plants (*Gymnosporæ*).

DIVISIONS, OR COHORTS.

Of Outside-growers.

A. Many-petalled plants (*Polypetalæ*).
B. One-petalled plants (*Monopetalæ*).
C. Non-petalled plants (*Apetalæ*).
D. Naked-seeded plants (*Gymnosperms*).

Of Inside-growers.

E. Spadix-bearing plants (*Spadicifloræ*).
F. Petal-bearing plants (*Petaloidæ*).
G. Glume-bearing plants (*Glumaceæ*).

Of Summit-growers.

H. Spore-flowered plants (*Sporogamia*).
I. Thallus-flowered plants (*Thallogamia*).
J. Axil-flowered plants (*Axogamia*).

Of Mass-growers.

K. Air-fed plants (*Aerophyta*).
L. Decay-fed plants (*Hysterophyta*).
M. Water-fed plants (*Hydrophyta*).

For ORDERS, GENERA, SPECIES, and other subdivisions, see Gray's and Wood's Botanies.

NATURAL ORDERS, OR FAMILIES.

EACH Division, or Cohort, is composed of groups of plants called *Orders*, or *Families;* thus, in the Polypetalous Divisions we have the *Ranunculaceæ* or Crowfoot Family, the *Caryophyllacæ* or Pink Family, the *Rosaceæ* or Rose Family.

GENERA.

Each Order, or Family, is made up of smaller groups of plants which resemble each other so closely that they may be said to be of the same *Kind* or *Genus*. For example: in the Rose Order or Family we have the plum-kind or plum genus, called *Prunus;* the strawberry genus, *Fragaria;* the rose genus, *Rosa;* the pear genus, *Pyrus*, etc.

SPECIES.

Each Genus includes still smaller groups called *Species*. Everybody knows that all roses are not alike, so it is easy to understand that while they are all known as roses they have a *special* name; as, the *damask* rose, the *white* rose, the *French* rose, etc. In Botany, this special name is the name of the species, and is placed after the name of the genus. Examples: *Rosa damascena* (damask rose); *Rosa alba* (white rose); *Rosa Gallica* (French rose), etc.

OTHER SUB-DIVISIONS.

These, according to Gray, are shown in the following schedule: —

Series,
CLASS,
Sub-class,
ORDER, or FAMILY,
Sub-order,
Tribe,
Sub-tribe,
GENUS,
Sub-genus, or Section,
SPECIES,
Variety.

Class, Order, Genus, and Species belong to the classification of all plants; but Variety, Sub-Genus, and the other subdivisions, whose names do not appear in capitals in the above schedule, are used more or less seldom, as occasion may require.

CHARACTERISTICS OF ORDERS, Etc.

The marks or characteristics of the Orders, Genera, Species, etc., are given in the Analytical Keys found in advanced books on Botany.

BOTANICAL NAMES.

In botanical descriptions every plant has at least two words in its name, and these are either Latin or Latinized words. The first word is the name of its genus; the last, that of its species. The first, or *generic* name, answers to the surname of a person; the last, or *specific* name, to a given or Christian name; thus, *Rosa alba* signifies the *white species* of the *rose genus; Populus alba*, the *white species* of the *poplar genus*.

HOW TO ANALYZE A PLANT.

1. Decide whether it be a flowering or a flowerless plant, *i.e.*, a *Phœnogam* or a *Cryptogam*.

2. If a *Phœnogam*, whether it be an outside or an inside-growing plant, *i.e.*, an *Exogen* or an *Endogen*.

3. Decide to which division or cohort it belongs. See the "Descriptions" and "Examples" of these on pages 135–138.

4. Determine to what order it belongs. This may be done by carefully examining every part of the plant, and consulting the "Analytical Key to the Natural Orders" as given in advanced text-books on Botany. See Gray's and Wood's Botanies.

5. Decide concerning its genus from the descriptions of the genera found in the text-book you may have chosen.

6. Lastly, find to what species it belongs, from the descriptions of species given in your text-book.

NOTE.

Botany is not, as many think, a science whose chief object is to give long names to little flowers. It acquaints the careful student with the characteristics and habits of the plants which he examines ; it discovers to him their place among the floral tribes and their relation to other plants.

For example, it shows that the little strawberry, the queenly rose, and the delicious peach have peculiar resemblances which make them of one family or order ; that the useful bean, the aspiring wistaria, and the noble locust are all akin ; while the plebeian onion, the fragrant hyacinth, and the aristocratic lily are closely related to each other.

This grouping together of plants according to their most important resemblances is the work of Jussieu and later botanists, whose aim has been to produce a system of classification which shall agree with the plan of Nature in the vegetable world.

To the lover of flowers we would say: Study those which are most common in gardens, or which you meet oftenest in your rambles through fields and woods. You will thus gradually become acquainted with many of the common orders or families of plants, and their name is not Legion, as your botany will tell you. (Gray's "School and Field Book" gives 111 orders of Exogens, 19 of Endogens, and 4 of Cryptogams.)

To help you in this work of studying, you will find a list of familiar trees, shrubs, etc., in the following pages. It is not in accordance with the rules of science to give help in this way, and, doubtless, our plan will provoke some adverse criticisms ; nevertheless, we know that many who have not time or opportunity to dig deep in scientific fields will be glad for this assistance, and use the list as an honest teacher uses a key to problems in arithmetic or algebra.

A HISTORY OF PLANTS, BOTANY, AND BOTANISTS.

PLANTS IN THE BIBLE.

THE only true account of the creation of plants is given in the first chapter of the Bible, in these words: "And God said, Let the earth bring forth grass, the herb yielding seed, and the fruit tree yielding fruit after his kind, whose seed is in itself, upon the earth: and it was so. And the earth brought forth grass, and herb yielding seed after his kind, and the tree yielding fruit, whose seed was in itself, after his kind: and God saw that it was good."

The story is very short; we would like to know more about what it means; perhaps we shall, some day; until then we must be content to believe that "the worlds were framed by the word of God, so that things which are seen were not made of things which do appear."

Again we are told that God planted a garden in Eden; still later a few quaint words tell of some gardeners who lived, probably in the time of King David, about 1000 B.C.: "Those that dwelt among plants and hedges: there they dwelt with the king for his work." (1 Chron. 4:23.)

Solomon, to whom God gave such wondrous wisdom, studied and wrote about plants, as we learn from 1 Kings 4:33: "And he spake of trees, from the cedar tree that is in Lebanon even unto the hyssop that springeth out of the wall." In one of his books, Ecclesiastes, he says: "I planted me vineyards: I made me gardens and orchards, and I planted trees in them of all kind of fruits."

These must have been very costly and beautiful, for, doubtless, the king spent his wealth upon them as freely as he did

upon the palaces and the temple, of which we have a more full description.

Other gardens are mentioned in the Scriptures, as Ahab's garden of herbs; the royal garden near the fortress of Zion; the royal garden of the Persian kings at Susa; the garden of Joseph of Arimathea; and the garden of Gethsemane. These gardens were not only for fragrant and beautiful plants, but were filled with some special kind of trees, after which they were named, as pomegranate-gardens, olive-gardens, vine-garden, nut-gardens, etc. They were usually situated outside of the city walls, and not, as with us, beside the dwellings of their owners. Thus, we find the garden of Gethsemane outside the city of Jerusalem.

Again, in the teachings of the Bible, many illustrations are taken from the vegetable world, as "the righteous shall flourish as the palm-tree; he shall grow like a cedar in Lebanon," or "he shall be like a tree planted by the rivers of water."

When the prophet Isaiah wishes to illustrate the frailty of man, he says: "We do all fade as a leaf;" and at another time he gladdens our hearts by the assurance that "as the earth bringeth forth her bud, and as the garden causeth the things that are sown in it to spring forth, so the LORD GOD will cause righteousness and praise to spring forth before all the nations."

And who does not recall the words of the blessed Master, spoken to keep us from anxious care: "And why take ye thought for raiment? Consider the lilies of the field, how they grow; they toil not, neither do they spin: And yet I say unto you, That even Solomon in all his glory was not arrayed like one of these. Wherefore, if God so clothe the grass of the field, which to day is, and to morrow is cast into the oven, shall he not much more clothe you, O ye of little faith?"

And those of the apostle as he argues concerning the resurrection of the dead: "But some man will say, How are the dead raised up? and with what body do they come? Thou fool, that which thou sowest is not quickened, except it die:

And that which thou sowest, thou sowest not that body that shall be, but bare grain, it may chance of wheat, or of some other grain: But God giveth it a body as it hath pleased him, and to every seed his own body. So also is the resurrection of the dead. It is sown in corruption, it is raised in incorruption: It is sown in dishonour, it is raised in glory: it is sown in weakness, it is raised in power: It is sown a natural body, it is raised a spiritual body. There is a natural body, and there is a spiritual body."

The last beatitude given in the last chapter of the precious volume, reads: "Blessed are they that do his commandments that they may have right to the tree of life and may enter in through the gates into the city."

Thus, though we gain but little direct scientific knowledge of plants from the Bible, the allusions it makes to them is of greater value, for they are constantly leading our thoughts from the things which are passing away to those which are eternal.

BOTANY IN ANCIENT TIMES,

And Before 1492 A.D.

Turning from the records of Holy Writ to the history of ancient times, we find that the early Chaldeans, Egyptians, and Greeks studied and wrote about plants, but had many curious and strange notions concerning them, supposing they had souls, and could think, and feel pleasure and pain.

Theophrastes, a pupil of Aristotle, wrote a "History of Plants," in which he described about five hundred kinds. In his writings he asks many questions which have not yet been answered. He died 287 B.C., *i.e.*, more than two thousand years ago.

Pliny, the Elder, who lived in the days of Nero, and perished in the eruption of Mt. Vesuvius, A.D. 79, left a description of one thousand specimens.

For many centuries very little progress was made in the knowledge of plants, and they were valued chiefly for their

beauty and fragrance, or for food, poison, or medicine. In the twelfth or thirteenth century, *herbariums*, or collections of dried plants, began to be preserved.

AFTER THE DISCOVERY OF AMERICA,

1492 A.D.

Botanical Gardens originated about the time of the discovery of America by Columbus. At first these were mostly for medicinal plants, but soon included other varieties, and became so popular that it is said that as many as sixteen hundred were planted between the years 1600 and 1700. They aided very greatly in the increase of botanical knowledge.

The *microscope*, also, which began to be used for scientific purposes in the seventeenth century, enabled the botanist to discover facts about plants which could not be learned by the naked eye.

Brunfels, a physician of Berne, published a history of plants, which he illustrated by a number of engravings. This was another step in advance.

Andreas Cesalpino, of Florence, about the time of the Reformation, was the first who attempted the arrangement of plants in classes.

John Ray, of Essex, Eng., lived from 1628–1705. He laid the basis of the Natural System in 1682. Among other things, he distinguished between flowering and flowerless plants, and between monocotyledons and dicotyledons. His orders were founded upon a correct idea of the affinities or relations of plants.

Tourneforte, born 1656, became the head of the French school of botany. He founded a system of classification which was in use for many years. In it he divided plants into herbs, under-shrubs, shrubs, and trees; his classes were distinguished by the absence, presence, and form of the corolla. He wrote several books of botany which were of much value.

Carle von Linne, or Linnæus, born May 23, 1707, died

January, 1778. He showed more plainly the differences between genera and species, and adopted the plan of giving each plant a double name; this is known as the Binomial Method of Nomenclature, and, as we have already seen, is in use at the present day. He founded a new Artificial System of Classification, based on the number of the stamens and pistils. His first great work was published in 1737; his system was taught in Great Britain and in this country until quite recently, long after it had been rejected in France and other countries for the Natural Method. He did good service for botany by making the terms used to describe plants more accurate, concise, and simple than those used by the earlier botanists.

BOTANY AFTER A.D. 1776.

ANTOINE LAURENT DE JUSSIEN, born at Lyons in 1748, died 1836, eighty-eight years old. He was botanical demonstrator in the Jardin des Plantes, Paris. This led to the careful arrangement and descriptions of plants, known as the Natural System, given in his "Genera Plantarum," begun in 1778, and finished in 1789.

ROBERT BROWN, in 1810, taught the Natural System of Classification in England.

AUGUSTUS PYRAMUS DE CANDOLLE, born 1778, has improved the Natural System of Jussien. His "Prodromus" is regarded as the standard work on "The Description of Species."[1] The number of species known to botanists at the present day is about a hundred thousand flowering plants, and twenty-five thousand flowerless plants.

Since the last part of the last century the improvements in the science of chemistry have greatly aided in the study of botany.

---

[1] The standard in the description of *genera* is Bentham and Hooker's "Genera Plantarum"; in the description of *natural orders*, Le Maout and Decaisne's works. Babbington's "English Flora," and the botanies of Gray, Wood, Chapman, and Watson, give descriptions of orders, genera, and species for the ordinary student. Miss Youmans' works are excellent for beginners.

The discovery of the compound microscope and achromatic lenses has made known facts concerning the organism of plants, the uses of their parts, and other important particulars which could not have been learned without these helps.

OTHER BOTANISTS. There are many others who have contributed to advance the science of botany as discoverers, patrons, or writers. Their names may be learned from cyclopedias and books on botany.

Much remains to be accomplished in the discovery and classification of plants, and facts concerning them. Perhaps some of those who study these pages will do some of this work, and be numbered among the celebrated botanists of the next fifty years. Who can tell?

CONCLUSION. It is no great wonder that man has been slow to learn about the far-away planets and other heavenly bodies, but it is a very humiliating thought that it has taken the world so many hundred years to discover what is now known about the plants which are springing up all around us, and which we love so well. Surely no one has cause to be proud of knowledge, or should refuse to bow in adoration before Him who calls each star by name, and knows the history of every plant He has created.

PART IV.

CLASSIFIED LISTS OF FAMILIAR PLANTS.

CLASSIFIED LISTS OF FAMILIAR PLANTS.

THE USE OF LATIN NOMENCLATURE.

Many persons object to the use of Latin names in nomenclature; they cannot see why we should not use the terms of the vernacular. Why call the hare-bell Campanula? Why the tree-toad, Hyla? In general conversation, it is well to use English if it will precisely define what we mean; but English, although a widely-disseminated language, is not the common tongue of all peoples. Again, local names are applied indifferently to quite diverse things. Our robin is not the English robin; indeed, not a robin at all. Our cowslip is the English marsh-marigold. In Australia, the early settlers found many animals closely resembling, in external appearance, the familiar creatures of their own land, and called them squirrels, foxes, etc.; whereas they are almost unique in structure, and belong to the curious orders of *Marsupialia* and *Monotremata*.

In botany, the confusion would be maddening. Any emigrant to a new country sees a flower which reminds him of his far-off home, and at once he calls it by the name which it bore in his native land; it may be a very different thing. To obviate this difficulty, scientists throughout the world have agreed to use Latin names, Latin being the court-language of science. So an investigation published in one country becomes known in all others, and adds to the general sum of human knowledge, as it is available to all. — *New England Journal of Education.*

DERIVATION OF THE NAMES OF PLANTS.

Orders. The names of orders are adjectives.

Sometimes they are those given before the adoption of the Natural System, as *Coniferæ*, cone-bearing plants; *Leguminosæ*, plants with a legume or pod. Sometimes the name is

taken from a principal genus of the order, as in *Liliaceæ* from the genus *Lilium;* such names end in *aceæ*, and the noun *plantæ* is understood: thus, *Violaceæ* means plants of the Violet family, order, or tribe.

GENERA. The names of genera are nouns.

These are ancient names; Greek or Latin names; words formed from the names of botanists or patrons of botany; or words derived from Greek or Latin words. Example: Labúrnum is an ancient name; Fùchsia for L. Fuchs, an early German botanist; Indigofera, from two words, meaning *producer of* indigo.

SPECIES. The names of species are adjectives, or substantives used as adjectives.

They denote some quality, peculiarity, or use of the plant; its native place; or they may be taken from the name of a person. If the person be the discoverer, the name is a Latin noun in the genitive singular; if only a patron, it is an adjective ending in *nus*, *a*, or *um*. Example: *Phlóx Drumóndii*, Drummond phlox; *Gerànium Robertiànum*, Herb Robert.

CAPITALS.

The names of classes, orders, and genera begin with capitals.

The names of species begin with capitals, if derived from those of persons or places, or if they are nouns used as adjectives; otherwise they begin with small letters. Example: *Prùnus Pérsicus* (peach); *Citrus Aurántium*, orange; *Ríbes rùbrum*, red currant.

ACCENTS.

Words of two syllables take the accent on the first syllable, whether marked or not. Example, *Rosa alba* = Ròsa àlba.

In Latin or Latinized names of more than two syllables, that which receives the accent is marked ´ or `.

The grave accent indicates the long sound of the vowel. *Cydònia vulgàris*, Quince.

The acute accent signifies that the vowel is short. *Citrus Aurántium*, Orange.

TREES.

Familiar Name.	*Botanical Name.*	*Family, or Order.*		*Division, or Cohort.*	*Sub-Class.*	*Class.*
Ailanthus.	Ailánthus glandulòsus.	Quassia,	Simarubaceæ.	Polypetalous.	Angiosperms.	Exogens.
Alder, Speckled.	Álnus incàna.	Birch,	Betulaceæ.	Apetalous.	"	"
Ash, White.	Fráxinus Americàna.	Olive,	Oleaceæ.	"	"	"
Aspen.	Pópulus tremuloìdes.	Willow,	Salicaceæ.	"	"	"
Balsam fir.	Àbies balsàmea.	Pine,	Coniferæ.	"	Gymnosperms.	"
Box.	Búxus sempérvirens.	Spurge,	Euphorbiaceæ.	"	Angiosperms.	"
Birch, Sweet.	Bétula lénta.	Birch,	Betulaceæ.	"	"	"
Catalpa.	Catálpa bignonioìdes.	Bignonia,	Bignoniaceæ.	Monopetalous.	"	"
Cedar, White.	Cupréssus thujoìdes.	Pine,	Coniferæ.	Apetalous.	Gymnosperms.	"
Cypress.	Cupréssus squarròsa.	Pine,	Coniferæ.	"	"	"
Dogwood.	Cárnus flórida.	Dogwood,	Cornaceæ.	Polypetalous.	Angiosperms.	"
Elm, American.	Úlmus Americàna.	Nettle,	Urticaceæ.	Apetalous.	"	"
Hemlock spruce.	Àbies Canadénsis.	Pine,	Coniferæ.	"	Gymnosperms.	"
Holly.	Ìlex opàca.	Holly,	Aquifoliaceæ.	Monopetalous.	Angiosperms.	"
Horse-chestnut.	Æsculus Hippocástanum.	Soapberry,	Sapindaceæ.	Polypetalous.	"	"
Juniper, Red cedar.	Junìperus Virginiàna.	Pine,	Coniferæ.	Apetalous.	Gymnosperms.	"
Larch.	Làrix Americàna.	Pine,	Coniferæ.	"	"	"
Linden.	Tília Americàna.	Linden,	Tiliaceæ.	Polypetalous.	Angiosperms.	"
Locust.	Robínia Pseudacàcia.	Pulse,	Leguminosæ.	"	"	"
Mahogany.	Swietènia Mahogani.	Melia,	Meliaceæ.	"	"	"
Magnolia.	Magnòlia grandiflòra.	Magnolia,	Magnoliaceæ.	"	"	"
Maple, Sugar.	Àcer saccharínum.	Soapberry,	Sapindaceæ.	Apetalous.	"	"
Mulberry, Paper.	Bronssonètia papyrífera.	Nettle,	Urticaceæ.	"	"	"
Oak, Red.	Quércus rùbra.	Oak,	Cupuliferæ.	"	"	"
Palm, Fan.	Borassus flabelliformis.	Palm,	Palmaceæ.	Spadiceous.	Aglumaceæ.	Endogens.
Palmetto.	Sàbal Palmètto.	Palm,	Palmaceæ.	"	"	"

Pine, White.	Pìnus Stróbus.	Pine,	Coniferæ.	Apetalous.	Gymnosperms.	Exogens.
Poplar, Lombardy.	Pópulus dilatàta.	Willow,	Salicaceæ.	"	Angiosperms.	"
Pride of India.	Mèlia Azédarach.	Melia,	Meliaceæ.	Polypetalous.	"	"
Rowan or mt. ash.	Pỳrus Americàna.	Rose,	Rosaceæ.	"	"	"
Sassafras.	Sássafras officinàle.	Laurel,	Lauraceæ.	Apetalous.	"	"
Silver fir.	Àbies pectinàta.	Pine,	Coniferæ.	"	Gymnosperms.	"
Slippery elm.	Úlmus fúlvia.	Nettle,	Urticaceæ.	"	Angiosperms.	"
Smoke-tree.	Rhus Cótinus.	Cashew,	Anacardiaceæ.	Polypetalous.	"	"
Spruce, White.	Àbies álba.	Pine,	Coniferæ.	Apetalous.	Gymnosperms.	"
Sweet gum-tree.	Liquidámbar Styracíflua.	Witch-hazel,	Hamamelaceæ.	"	Angiosperms.	"
Sycamore.	Plátanus occidentàlis.	Plane-tree,	Platanaceæ.	"	"	"
Tulip-tree.	Liriodéndron Tulipífera.	Magnolia,	Magnoliaceæ.	Polypetalous.	"	"
Willow, Weeping.	Sàlix Babylónica.	Willow,	Salicaceæ.	Apetalous.	"	"
Yew.	Táxus Canadénsis.	Pine,	Coniferæ.	"	Gymnosperms.	"

SHRUBS.

Familiar Name.	*Botanical Name.*	*Family, or Order.*		*Division.*	*Sub-Class.*	*Class.*
Azalea.	Azàlea Índica.	Heath,	Ericaceæ.	Apetalous.	Angiosperms.	Exogens.
Bouvardia.	Bouvárdia trýphylla.	Madder,	Rubiaceæ.	"	"	"
Box.	Búxus nàna.	Spurge,	Euphorbiaceæ.	"	"	"
Buckthorn.	Rhámnus cathárticus.	Buckthorn.	Rhamnaceæ.	Polypetalous.	"	"
Daphne.	Dáphne Mezèrsum.	Mezereum,	Thymeleaceæ.	Apetalous.	"	"
Deutzia.	Deútzia crenàta.	Saxifrage,	Saxifragaceæ.	Polypetalous.	"	"
Flowering almond.	Prùnus nàna.	Rose,	Rosaceæ.	"	"	"
Forsythia.	Forsýthia viridíssima.	Olive,	Oleaceæ.	Monopetalous.	"	"
Fringe-tree.	Chionánthus Virgínica.	Olive,	Oleaceæ.	"	"	"
Fuchsia, Lady's eardrop.	Fùchsia macrostémma.	Even'g primrose,	Onagraceæ.	Polypetalous.	"	"

SHRUBS. — *Continued.*

Familiar Name.	*Botanical Name.*	*Family, or Order.*		*Division.*	*Sub-Class.*	*Class.*
Hydrangea.	Hydrángea Horténsia.	Saxifrage,	Saxifragaceæ.	Apetalous.	Angiosperms.	Exogens.
Japan quince.	Cydònia Japónica.	Rose,	Rosaceæ.	"	"	"
Jerusalem cherry.	Solànum Pseudo-Cápsicum.	Nightshade,	Solanaceæ.	Monopetalous.	"	"
Judas-tree.	Cércis Canadénsis.	Pulse,	Leguminoseæ.	Polypetalous.	"	"
Kalmia(Am. laurel).	Kalmia latifòlia.	Heath,	Ericaceæ.	Monopetalous.	"	"
Laburnum.	Labúrnum vulgàre.	Pulse,	Leguminoseæ.	Polypetalous.	"	"
Lavender.	Lavándula vèra.	Mint,	Labiatæ.	Monopetalous.	"	"
Leatherwood.	Dírca palústris.	Mezereum,	Thymeleaceæ.	"	"	"
Lilac.	Syrínga vulgàris.	Olive,	Oleaceæ.	"	"	"
Magnolia.	Magnòlia glaùca.	Magnolia,	Magnoliaceæ.	Polypetalous.	"	"
Mahonia.	Bérberis Aquifòlium.	Barberry,	Berberidaceæ.	"	"	"
Oleander.	Nèrium Oleánder.	Dogbane,	Apocynaceæ.	Monopetalous.	"	"
Rhodora.	Rhodòra Canadénsis.	Heath,	Ericaceæ.	"	"	"
Rose, Acacia.	Robínia híspidia.	Pulse,	Leguminoseæ.	Polypetalous.	"	"
Rose, Bay.	Rhododéndron Catawbiénse.	Heath,	Ericaceæ.	Monopetalous.	"	"
Shadbush.	Amelánchier Canadénsis.	Rose,	Rosaceæ.	Polypetalous.	"	"
Snowberry.	Symphoricárpus racemòsus.	Honeysuckle,	Caprifoliaceæ.	Monopetalous.	"	"
Snowball.	Vibúrnum Opulus.	Honeysuckle,	Caprifoliaceæ.	"	"	"
Southernwood.	Artemísia Abrotánum.	Composite,	Compositæ.	"	"	"
Spiræa.	Spiræa sorbifòlia.	Rose,	Rosaceæ.	Polypetalous.	"	"
Sumach.	Rhus tỳphina.	Cashew,	Anarcardiaceæ.	"	"	"
Sweet-scented shrub.	Calycánthus flóridus.	Calycanthus,	Calycanthaceæ.	"	"	"
Syringa.	Philadélphus coronàrius.	Saxifrage,	Saxifragaceæ.	"	"	"
Viburnum.	Vibúrnum Tinus.	Honeysuckle.	Caprifoliaceæ.	Monopetalous.	"	"
Weigelia.	Azàlea viscòsa.	Heath,	Ericaceæ.	"	"	"

FRUIT TREES.

Familiar Name.	*Botanical Name.*	*Family, or Order.*		*Division.*	*Sub-Class.*	*Class.*
Apple.	Pỳrus Màlus.	Rose,	Rosaceæ.	Polypetalous.	Angiosperms.	Exogens.
Apricot.	Prùnus Armenìaca.	Rose,	Rosaceæ.	"	"	"
Banana.	Mùsa sapiéntum.	Banana,	Scitamineæ.	Petaloideous.	Aglumaceæ.	Endogens.
Cherry.	Prùnus Cérasus.	Rose,	Rosaceæ.	Polypetalous.	Angiosperms.	Exogens.
Citron, Common.	Citrúllus vulgàris. Var.	Gourd,	Cucurbitaceæ.	Monopetalous.	"	"
Crab-apple.	Pỳrus prunifòlia.	Rose,	Roseaceæ.	Polypetalous.	"	"
Date.	Phœnix dactylífera.	Palm,	Palmaceæ.	Spadiceous.	Aglumaceæ.	Endogens.
Fig.	Ficus Cárica.	Nettle,	Urticaceæ.	Apetalous.	Angiosperms.	Exogens.
Lemon.	Cítrus Limònium.	Rue,	Rutaceæ.	Polypetalous.	"	"
Lime.	Cítrus Limétta.	Rue,	Rutaceæ.	"	"	"
Nectarine.	Prùnus lævis.	Rose,	Rosaceæ.	"	"	"
Orange.	Cítrus Aurántium.	Rue,	Rutaceæ.	"	"	"
Papaw.	Asímina tríloba.	Custard-apple,	Anonaceæ.	"	"	"
Peach.	Prùnus Pérsica.	Rose,	Rosaceæ.	"	"	"
Pear.	Pỳrus commùnis.	Rose,	Rosaceæ.	"	"	"
Persimmon.	Diospýros Virginiàna.	Ebony,	Ebenaceæ.	Monopetalous.	"	"
Pineapple.	Ananássa satìva.	Pine-apple,	Bromeliaceæ.	Petaloideous.	Aglumaceæ.	Endogens.
Plum, Garden.	Prùnus doméstica.	Rose,	Rosaceæ.	Polypetalous.	Angiosperms.	Exogens.
Pomegranate.	Pùnica Granàtum.	Loosestrife,	Lythraceæ.	Apetalous.	"	"
Quince.	Cydònia vùlgaris.	Rose,	Rosaceæ.	Polypetalous.	"	"
Shaddock.	Cítrus decumàna.	Rue,	Rutaceæ.	"	"	"
Tamarind.	Tamaríndus Indíca.	Pulse,	Leguminosæ.	"	"	"
Bread-fruit.	Artocàrpus incísa.	Nettle,	Urticaceæ.	Apetalous.	"	"
Cashew-nut.	Anacàrdium occidentále.	Cashew,	Anacardiaceæ.	Polypetalous.	"	"

FRUIT SHRUBS, Etc.

Familiar Name.	*Botanical Name.*	*Family, or Order.*		*Division.*	*Sub-Class.*	*Class.*
Currant, Red.	Rìbes rùbrum.	Saxifrage,	Saxifragaceæ.	Polypetalous.	Angiosperms.	Exogens.
Barberry.	Bérberis vulgàris.	Barberry,	Berberidaceæ.	"	"	"
Blackberry.	Rùbus villòsus.	Rose,	Rosaceæ.	"	"	"
Blueberry.	Vaccínium Pennsylvánicum.	Heath,	Ericaceæ.	Monopetalous.	"	"
Cranberry.	Vaccínium macrocárpon.	Heath,	Ericaceæ.	"	"	"
Gooseberry.	Rìbes Grossulària.	Saxifrage,	Saxifragaceæ.	Polypetalous.	"	"
Grape.	Vìtis Labrúsca.	Vine,	Vitaceæ.	"	"	"
Mulberry, Black.	Mòrus nìgra.	Nettle,	Urticaceæ.	Apetalous.	"	"
Raspberry.	Rùbus Idæus.	Rose,	Roseaceæ.	Polypetalous.	"	"
Strawberry.	Fragària Virginiàna.	Rose,	Roseaceæ.	"	"	"
Whortleberry.	Gayluscácia resinòsa.	Heath,	Ericaceæ.	Monopetalous.	"	"
Wintergreen-berry.	Gaulthèria procúmbens.	Heath,	Ericaceæ.	"	"	"

NUT TREES, Etc.

Familiar Name.	*Botanical Name.*	*Family, or Order.*		*Division.*	*Sub-Class.*	*Class.*
Almond.	Amýgdalus commùnis.	Rose,	Rosaceæ.	Polypetalous.	Angiosperms.	Exogens.
Beech-nut.	Fàgus ferrugínea.	Oak,	Cupuliferæ.	Apetalous.	"	"
Brazil-nut.	Berthollètia excélsa.	Myrtle,	Myrtaceæ.	Polypetalous.	"	"
Butternut.	Jùglans cinèrea.	Walnut,	Juglandaceæ.	Apetalous.	"	"
Chestnut.	Castànea Americàna.	Oak,	Cupuliferæ.	"	"	"
Cocoanut.	Còcos nucífera.	Palm,	Palmaceæ.	Spadiceous.	Aglumaceæ.	Endogens.
Filbert.	Córylus Avellàna.	Oak,	Cupuliferæ.	Apetalous.	Angiosperms.	Exognes.
Hazel-nut.	Córylus Americàna.	Oak,	Cupuliferæ.	"	"	"
Hickory-nut.	Cárya àlba.	Walnut,	Juglandaceæ.	"	"	"

Madeira-nut.	Jùglans règia.	Walnut,	Juglandaceæ.	"	"	"
Peanut.	Árachus hypogæa.	Pulse,	Leguminosæ.	Polypetalous.	"	"
Pecan-nut.	Cárya olivæfórmis.	Walnut,	Juglandaceæ.	Apetalous.	"	"
Pistachio.	Pistàcia vèra.	Cashew,	Anacardiaceæ.	Polypetalous.	"	"
Walnut.	Jùglans Nìgra.	Walnut,	Juglandaceæ.	Apetalous.	"	"

KITCHEN GARDEN.

ROOTS AND UNDERGROUND PARTS.

Familiar Name.	*Botanical Name.*	*Family, or Order.*		*Division.*	*Sub-Class.*	*Class.*
Artichoke.	Cýnara Scólymus.	Composite,	Compositæ.	Monopetalous.	Angiosperms.	Exogens.
Beet.	Bèta vulgàris.	Goosefoot,	Chenopodiaceæ.	Apetalous.	"	"
Chicory.	Cichòrium Íntybus.	Composite,	Compositæ.	Monopetalous.	"	"
Carrot.	Daùcus caròta.	Parsley,	Umbelliferæ.	Polypetalous.	"	"
Chives.	Állium Schœnóprasum.	Lily,	Liliaceæ.	Petaloideous.	Aglumaceæ.	Endogens.
Garlic.	Állium satìvum.	Lily,	Liliaceæ.	"	"	"
Horse-radish.	Nastúrtium Armoràcia.	Mustard,	Cruciferæ.	Polypetalous.	Angiosperms.	Exogens.
Onion.	Állium Cèpa.	Lily,	Liliaceæ.	Petaloideous.	Aglumaceæ.	Endogens.
Parsnip.	Pastinàca satìva.	Parsley,	Umbelliferæ.	Polypetalous.	Angiosperms.	Exogens.
Potato.	Solànum tuberòsum.	Nightshade,	Solanaceæ.	Monopetalous.	"	"
Radish.	Ráphanus satìvus.	Mustard,	Cruciferæ.	Polypetalous.	"	"
Ruta-baga.	Brássica campéstris. Var.	Mustard,	Cruciferæ.	"	"	"
Salsify (oyster-plant).	Tragopògon porrifòlius.	Composite,	Compositæ.	Monopetalous.	"	"
Shallot.	Állium Ascalónicum.	Lily,	Liliaceæ.	Petaloideous.	Aglumaceæ.	Endogens.
Sweet-potato.	Ipomœa Batátas.	Convolvulus,	Convolvulaceæ.	Monopetalous.	Angiosperms.	Exogens.
Turnip.	Brássica Nápus.	Mustard,	Cruciferæ.	Polypetalous.	"	"
Ginger.	Hedýchium Gardneriànam.	Banana,	Scitamineæ.	Petaloideous.	Aglumaceæ.	Endogens.
Yam.	Dioscorèa satìva.	Yam,	Dioscorsaceæ.	"	"	"

STEMS.

Familiar Name.	*Botanical Name.*	*Family, or Order.*		*Division.*	*Sub-Class.*	*Class.*
Asparagus.	Aspáragus officinàlis.	Lily,	Liliaceæ.	Petaloideous.	Aglumaceæ.	Endogens.
Celery.	Àpium graveòlens.	Parsley,	Umbelliferæ.	Polypetalous.	Angiosperms.	Exogens.
Kohl-rabi.	Brássica oleràcea. Var.	Mustard,	Cruciferæ.	"	"	"
Leek.	Állum Pórrum.	Lily,	Liliaceæ.	Petaloideous.	Aglumaceæ.	Endogens.
Rhubarb.	Rhèum Rhapónticum.	Buckwheat,	Polygonaceæ.	Apetalous.	Angiosperms.	Exogens.
Sea-kale.	Crámbe marítima.	Mustard,	Cruciferæ.	Polypetalous.	"	"

LEAVES.

Familiar Name.	*Botanical Name.*	*Family, or Order.*		*Division.*	*Sub-Class.*	*Class.*
Brussels sprouts.	Brássica oleràcea. Var.	Mustard,	Cruciferæ.	Polypetalous.	Angiosperms.	Exogens.
Borecole, or kale.	" " "	"	"	"	"	"
Broccoli.	" " "	"	"	"	"	"
Cabbage.	" " "	"	"	"	"	"
Cress.	Nastúrtium officinàle.	"	"	"	"	"
Cauliflower.	Brássica oleràcea. Var.	"	"	"	"	"
Corn salad.	Fèdia olitòria.	Valerian,	Valerianaceæ.	"	"	"
Endive.	Cichòrium Endívia.	Composite,	Compositæ.	Monopetalous.	"	"
Lettuce.	Lactùca satìva.	Composite,	"	"	"	"
Parsley.	Càrum Petroselìnum.	Parsley,		Polypetalous.	"	"
Spinach.	Spinàcia oleràcea.	Goosefoot,	Chenopodiaceæ.	Apetalous.	"	"

SEED-HOLDERS.

Familiar Name.	*Botanical Name.*	*Family, or Order.*		*Division.*	*Sub-Class.*	*Class.*
Cucumber.	Cùcumis satìvus.	Gourd,	Cucurbitaceæ.	Monopetalous.	Angiosperms.	Exogens.
Egg-plant.	Solànum Melongèna.	Nightshade,	Solanaceæ.	"	"	"
Gherkin.	Cùcumis Angùria.	Gourd,	Cucurbitaceæ.	"	"	"
Musk-melon.	Cùcumis Mèlo.	Gourd,	Cucurbitaceæ.	"	"	"
Okra.	Hibíscus esculéntus.	Mallow,	Malvaceæ.	Polypetalous.	"	"
Pumpkin.	Cucúrbita Pĕpo.	Gourd,	Cucurbitaceæ.	Monopetalous.	"	"
Peppers, Red.	Cápsicum ánnuum.	Nightshade,	Solanaceæ.	"	"	"
Squash.	Cucúrbita verrucòsa.	Gourd,	Cucurbitaceæ.	"	"	"
Strawberry tomato.	Phýsalis Alkekéngi.	Nightshade,	Solanaceæ.	"	"	"
Tomato.	Lycopérsicum esculéntum.	Nightshade,	Solanaceæ.	"	"	"
Water-melon.	Citrúllus vulgàris.	Gourd,	Cucurbitaceæ.	"	"	"

SEEDS.

Familiar Name.	*Botanical Name.*	*Family, or Order.*		*Division.*	*Sub-Class.*	*Class.*
Indian corn.	Zèa Màys.	Grass,	Gramineæ.	Glumaceæ.	Glumaceæ.	Endogens.
Bean.	Phaseòlus vulgàris.	Pulse,	Leguminoseæ.	Polypetalous.	Angiosperms.	Exogens.
Lima bean.	Phaseòlus lunàtus.	Pulse,	Leguminoseæ.	"	"	"
Martynia.	Martýnia proboscídea.	Bignonia,	Bignoniaceæ.	Monopetalous.	"	"
Mustard, White.	Brássica álba.	Mustard,	Cruciferæ.	Polypetalous.	"	"
Mustard, Black.	Brássica nìgra.	Mustard,	Cruciferæ.	"	"	"
Pea, Garden.	Pìsum satìvum.	Pulse,	Leguminoseæ.	"	"	"

GRAINS.

Familiar Name.	*Botanical Name.*	*Family, or Order.*		*Division.*	*Sub-Class.*	*Class.*
Barley.	Hórdeum vulgàre.	Grass,	Gramineæ.	Glumaceous.	Glumaceæ.	Endogens.
Buckwheat.	Fagopỳrum esculéntum.	Buckwheat,	Polygonaceæ.	Apetalous.	Angiosperms.	Exogens.
Oat.	Avéna satìva.	Grass,	Gramineæ.	Glumaceous.	Glumaceæ.	Endogens.
Rice.	Orỳza satìva.	"	"	"	"	"
Rye.	Secàle ceràle.	"	"	"	"	"
Wheat.	Tríticum vulgàre.	"	"	"	"	"

VINES.

Familiar Name.	*Botanical Name.*	*Family, or Order.*		*Division.*	*Sub-Class.*	*Class.*
Alleghany vine.	Adlúmia cirrhòsa.	Fumitory,	Fumariaceæ.	Polypetalous.	Angiosperms.	Exogens.
Abutilon, Striped.	Abùtilon striàtum.	Mallow,	Malvaceæ.	"	"	"
Balloon-vine.	Cardiospérmum Halicácabum.	Soapberry,	Sapindaceæ.	"	"	"
Clematis.	Clématis pàtens.	Crowfoot,	Ranunculaceæ.	Apetalous.	"	"
Cobæa.	Cobæa scàndens.	Polemonium,	Polemoniaceæ.	Monopetalous.	"	"
Corydalis, Golden.	Corỳdalis aùrea.	Fumitory,	Fumariaceæ.	Polypetalous.	"	"
Convolvulus.	Convólvulus trícolor.	Convolvulus,	Convolvulaceæ.	Monopetalous.	"	"
Cypress-vine.	Quámoclit vulgàris.	Convolvulus,	Convolvulaceæ.	"	"	"
Honeysuckle, Trumpet.	Lonicèra sempévirens.	Honeysuckle,	Caprifoliaceæ.	"	"	"
Hyacinth bean.	Dólichos Láblab.	Pulse,	Leguminosæ.	Polypetalous.	"	"
Ivy, English.	Hédera Hèlix.	Ginseng,	Araliaceæ.	"	"	"
Madeira-vine.	Boussingaúltia bassellolàdes.	Goosefoot,	Chenopodiaceæ.	Apetalous.	"	"

Maurandia.	Maurándia Barclayàna.	Figwort,	Scrophulariaceæ.	Monopetalous.	"	"
Morning-glory.	Ipomœa purpùrea.	Convolvulus,	Convolvulaceæ.	"	"	"
Nasturtium.	Tropæ̀olum màjus.	Geranium,	Geraniaceæ.	Polypetalous.	"	"
Passion-flower.	Passiflòra cærùlea.	Passion-flower,	Passifloraceæ.	"	"	"
Periwinkle.	Vínca mìnor.	Dogbane,	Apocynaceæ.	Monopetalous.	"	"
Smilax.	Myrsiphýllum asparagoìdes.	Lily,	Liliaceæ.	Petaloideous.	Aglumaceæ.	Endogens.
Sweet pea.	Láthyrus odoràtus.	Pulse,	Leguminosæ.	Polypetalous.	Angiosperms.	Exogens.
Trumpet-flower.	Técoma radìcans.	Bignonia,	Bignoniaceæ.	Monopetalous.	"	"
Virginia creeper (Am. Ivy).	Ampelópsis quinquefòlia.	Vine,	Vitaceæ.	Polypetalous.	"	"
Woodbine Honeysuckle.	Lonícera Periclýmenum.	Honeysuckle,	Caprifoliaceæ.	Monopetalous.	"	"
Waxwork.	Celástrus scándens.	Staff-tree,	Celastraceæ.	Polypetalous.	"	"
Wistaria.	Wistària Sinénsis.	Pulse,	Leguminosæ.	"	"	"

BULBOUS-ROOTED PLANTS.

Familiar Name.	*Botanical Name.*	*Family, or Order.*		*Division.*	*Sub-Class.*	*Class.*
Amaryllis.	Amarýllis speciòsa.	Amaryllis,	Amaryllidaceæ.	Petaloideous.	Aglumaceæ.	Endogens.
Anemone, Garden.	Anemòne hortènsis.	Crowfoot,	Ranunculaceæ.	Apetalous.	Angiosperms.	Exogens.
Century plant(Aloe).	Agàve Americàna.	Amaryllis,	Amaryllidaceæ.	Petaloideous.	Aglumaceæ.	Endogens.
Crocus.	Cròcus vérnus.	Iris,	Iridaceæ.	"	"	"
Corn flag.	Gladìolus psittacìnus.	Iris,	Iridaceæ.	"	"	"
Crown Imperial.	Fritillària imperiàlis.	Lily,	Liliaceæ.	"	"	"
Daffodil.	Narcíssus Pseudo-Narcíssus.	Amaryllis,	Amaryllidaceæ.	"	"	"
Dahlia.	Dáhlia variábilis.	Composite,	Compositæ.	Monopetalous.	Angiosperms.	Exogens.
Hyacinth.	Hyacínthus orientàlis.	Lily,	Liliaceæ.	Petaloideous.	Aglumaceæ.	Endogens.
Iris (Blue flag).	Ìris Germánica.	Iris,	Iridaceæ.	"	"	"

BULBOUS-ROOTED PLANTS. — *Continued.*

Familiar Name.	*Botanical Name.*	*Family, or Order.*		*Division.*	*Sub-Class.*	*Class.*
Jacobæan lily.	Amarýllis formosíssima.	Amaryllis,	Amaryllidaceæ.	Petaloideous.	Aglumaceæ.	Endogens.
Jonquil.	Narcíssus Jonquílla.	Amaryllis,	Amaryllidaceæ.	"	"	"
Lily, White.	Lílium cándidum.	Lily,	Liliaceæ.	"	"	"
Lily-of-the-valley.	Convallària majàlis.	Lily,	Liliaceæ.	"	"	"
Narcissus.	Narcíssus polyánthus.	Amaryllis,	Amaryllidaceæ.	"	"	"
Pæony.	Pæònia officinàlis.	Crowfoot,	Ranunculaceæ.	Polypetalous.	Angiosperms.	Exogens.
Snowflake.	Leucòium æstìvum.	Amaryllis,	Amaryllidaceæ.	Petaloideous.	Aglumaceæ.	Endogens.
Snowdrop.	Galánthus nivàlus.	Amaryllis,	Amaryllidaceæ.	"	"	"
Tiger flower.	Tigrídia pavònia.	Iris,	Iridaceæ.	"	"	"
Tuberose.	Políanthes tuberòsa.	Amaryllis,	Amaryllidaceæ.	"	"	"
Tulip.	Tùlipa Gesneriàna.	Lily,	Liliaceæ.	"	"	"

GARDEN FLOWERS. I.

Familiar Name.	*Botanical Name.*	*Family, or Order.*		*Division.*	*Sub-Class.*	*Class.*
Adam's needle.	Yúcca filamentòsa.	Lily,	Liliaceæ.	Petaloideous.	Aglumaceæ.	Endogens.
Begonia.	Begònia nítidia.	Begonia,	Begoniaceæ.	Polypetalous.	Angiosperms.	Exogens.
Bleeding heart.	Dicéntra spectábilis.	Fumitory,	Fumariaceæ.	"	"	"
Bluebottle.	Centaurèa Cỳanus.	Composite,	Compositæ.	Monopetalous.	"	"
Cactus.	Cèreus speciosíssimus.	Cactus,	Cactaceæ.	Polypetalous.	"	"
Calla.	Richárdia Æthiópica.	Arum,	Araceæ.	Spadiceous.	Aglumaceæ.	Endogens.
Camellia.	Caméllia Japónica.	Tea,	Camelliaceæ.	Polypetalous.	Angiosperms.	Exogens.
Canterbury bell.	Campánula Mèdium.	Campanula,	Campanulaceæ.	Monopetalous.	"	"
Cape jessamine.	Gardènia flórida.	Madder,	Rubiaceæ.	"	"	"

Carnation.	Diánthus Caryophýllus.	Pink,	Caryophyllaceæ.	Polypetalous.	"	"
Castor-oil plant.	Rícinus commùnis.	Spurge,	Euphorbiaceæ.	Apetalous.	"	"
Catchfly, Royal.	Silène règia.	Pink,	Caryophyllaceæ.	Polypetalous.	"	"
Cleome.	Cleòme púngens.	Caper,	Capparidaceæ.	"	"	"
Coleus.	Còleus Blùmei.	Mint,	Labiatæ.	Monopetalous.	"	"
Cowslip.	See Polyanthus.	Primrose,	Primulaceæ.	"	"	"
Cyclamen (Sow-bread).	Cyclamen Europæan.	Primrose,	Primulaceæ.	"	"	"
Dusty miller.	Senécio Cinerària.	Composite,	Compositæ.	"	"	"
Feverfew.	Pyrèthrum Parthènium.	Composite,	Compositæ.	"	"	"
Fire-cracker plant.	Cùphea platycéntra.	Loosetrife,	Lythraceæ.	Apetalous.	"	"
Foxglove.	Digitàlis purpùrea.	Figwort,	Scrophulariaceæ.	Monopetalous.	"	"
Geranium, Rose.	Pelargònium capitàtum.	Geranium,	Geraniaceæ.	Polypetalous.	"	"
German ivy.	Senècio scándens.	Composite,	Compositæ.	Monopetalous.	"	"
Globe amaranth.	Gomphrèna globòsa.	Amaranth,	Amarantaceæ.	Apetalous.	"	"
Hollyhock.	Althæa ròsea.	Mallow,	Malvaceæ.	Monopetalous.	"	"
Honey-bell.	Mahérnia verticillàta.	Sterculia,	Sterculiaceæ.	Polypetalous.	"	"
Honesty.	Lunària biénnis.	Mustard,	Cruciferæ.	"	"	"
Houseleek.	Sempervìvum tectòrum.	Orpine,	Crassulaceæ.	"	"	"
Ice plant.	Mesembryánthemum crystállinum.	Fig marigold,	Mesembryanthemeæ.	"	"	"
Jacob's ladder.	Polemònium cærùleum.	Polemonium,	Polemoniaceæ.	Monopetalous.	"	"
Jasmine, Yellow.	Jásminum odoratíssimum.	Olive,	Oleaceæ.	"	"	"
Lady's pocket.	Calceolària crenatiflòra.	Figwort,	Scrophulariaceæ.	"	"	"
Lantana.	Lantàna míxta.	Vervain,	Verbenaceæ.	"	"	"
Lemon verbena.	Líppia citriodòra (Aloýsia).	Vervain,	Verbenaceæ.	"	"	"
Lobelia, Blue.	Lobèlia Erìnus.	Lobelia,	Lobeliaceæ.	"	"	"
Love-in-a-mist.	Nigélla Damascèna.	Crowfoot,	Ranunculaceæ.	"	"	"

GARDEN FLOWERS. I. — *Continued.*

Familiar Name.	*Botanical Name.*	*Family, or Order.*		*Division.*	*Sub-Class.*	*Class.*
Moss-pink.	Phlóx subuláta.	Polemonium,	Polemoniaceæ.	Monopetalous.	Angiosperms.	Exogens.
Musk-plant.	Mímulus moschàta.	Figwort,	Scrophuloriaceæ.	"	"	"
Myrtle, Common.	Mýrtus commùnis.	Myrtle,	Myrtaceæ.	Polypetalous.	"	"
Oxalis.	Oxalis versícolor.	Geranium,	Geraniaceæ.	"	"	"
Paulownia.	Paulównia imperiàlis.	Figwort,	Scrophulariaceæ.	Monopetalous.	"	"
Pentstemon.	Pentstèmon Hartwègi.	Figwort,	Scrophulariaceæ.	"	"	"
Polyanthus.	Prímula officinàlis.	Primrose,	Primulaceæ.	"	"	"
Poppy.	Papàver somníferum.	Poppy,	Papaveraceæ.	Polypetalous.	"	"
Primrose, Chinese.	Prímula Sinénsis.	Primrose,	Primulaceæ.	Monopetalous.	"	"
Prince's feather.	Amaránth caudàtus.	Amaranth,	Amarantaceæ.	Apetalous.	"	"
Rocket.	Hésperis matronàlis.	Mustard,	Cruciferæ.	Polypetalous.	"	"
Scarlet Salvia.	Sálvia spléndens.	Mint,	Labiatæ.	Monopetalous.	"	"
Spiderwort.	Tradescántia Virgínica.	Spiderwort,	Commelynaceæ.	"	Aglumaceæ.	Endogens.
Stock, Ten-week.	Matthiòla ánnua.	Mustard,	Cruciferæ.	"	Angiosperms.	Exogens.
Stonecrop.	Sèdum àcre.	Orpine,	Crassulaceæ.	"	"	"
Sweet alyssum.	Alýssum marítimum.	Mustard,	Cruciferæ.	"	"	"
Sweet clover.	Melilòtus àlba.	Pulse,	Leguminosæ.	"	"	"
Sweet William.	Diánthus barbàtus.	Pink,	Caryophyllaceæ.	"	"	"
Tassel flower.	Senècio sonchifòlia.	Composite,	Compositæ.	"	"	"
Thrift.	Armèria vulgàris.	Leadwort,	Plumbaginaceæ.	Polypetalous.	"	"
Valerian.	Valeriàna officinàlis.	Valerian,	Valerianaceæ.	Monopetalous.	"	"
Wallflower.	Cheìranthus Cheìri.	Mustard,	Cruciferæ.	Polypetalous.	"	"
Whitlavia.	Whitlàvia grandifiòra.	Waterleaf,	Hydrophyllaceæ.	Monopetalous.	"	"

GARDEN FLOWERS. II.

Familiar Name.	*Botanical Name.*	*Family, or Order.*		*Division.*	*Sub-Class.*	*Class.*
Ageratum.	Agératum conyzoìdes.	Composite,	Compositæ.	Monopetalous.	Angiosperms.	Exogens.
Balsam.	Impàtiens Balsámina.	Geranium,	Geraniaceæ.	Polypetalous.	"	"
California poppy.	Eschschóltzia Califórnica.	Poppy,	Papaveraceæ.	"	"	"
Candytuft.	Ibèris umbellàta.	Mustard,	Cruciferæ.	"	"	"
China aster.	Callístephus Chinénses.	Composite,	Compositæ.	Monopetalous.	"	"
Chrysanthemum.	Chrysánthemumròseum.	Composite,	Compositæ.	"	"	"
Cockscomb.	Celòsia cristàta.	Amaranth,	Amarantaceæ.	Apetalous.	"	"
Coreopis.	Coreópsis tinctòria.	Composite,	Compositæ.	Monopetalous.	"	"
Daisy, English.	Béllis periénnis.	Composite,	Compositæ.	"	"	"
Evening primrose.	Œnothèra Lamarckiàna.	Ev'g Primrose,	Onagraceæ.	Polypetalous.	"	"
Forget-me-not.	Myosòtis palústris.	Borage,	Borraginaceæ.	Monopetalous.	"	"
Four-o'clock.	Mirábilis Jalápa.	Four-o'clock,	Nyctaginaceæ.	Apetalous.	"	"
Gaillardia.	Gaillárdia pulchélla.	Composite,	Compositæ.	Monopetalous.	"	"
Gilia.	Gília capitàta.	Polemonium,	Polemoniaceæ.	"	"	"
Heliotrope, Sweet.	Heliotròpium Peruviànum.	Borage,	Borraginaceæ.	"	"	"
Larkspur.	Delphínium Ajàcis.	Crowfoot,	Ranunculaceæ.	Polypetalous.	"	"
Lupine.	Lupìnus polyphýllus.	Pulse,	Leguminosæ.	"	"	"
Marigold, French.	Tagètes pátula.	Composite,	Compositæ.	Monopetalous.	"	"
Mignonette.	Resèda odoràta.	Mignonette,	Resedaceæ.	Polypetalous.	"	"
Mourning bride.	Scabiòsa atropurpùrea.	Teasel,	Dipsaceæ.	Monopetalous.	"	"
Pansy.	Viòla trícolor.	Violet,	Violaceæ.	Polypetalous.	"	"
Petunia.	Petùnia violàcea.	Nightshade,	Solanaceæ.	Monopetalous.	"	"
Phacelia.	Phacèlia congésta.	Waterleaf,	Hydrophyllaceæ.	"	"	"
Phlox.	Phlóx Drummóndii.	Polemonium,	Polemoniaceæ.	"	"	"
Portulaca.	Portulàca grandiflòra.	Purslane,	Portulacaceæ.	Polypetalous.	"	"
Primrose, True.	Prímula grandiflòra.	Primrose,	Primulaceæ.	Monopetalous.	"	"

GARDEN FLOWERS. II. — *Continued.*

Familiar Name.	*Botanical Name.*	*Family, or Order.*		*Division.*	*Sub-Class.*	*Class.*
Quaking grass.	Brìza máxima.	Grass,	Gramineæ.	Glumaceous.	Glumaceous.	Endogens.
Ragged Robin.	Lýchnis Flos-cùculi.	Pink,	Caryophyllaceæ.	Polypetalous.	Angiosperms.	Exogens.
Spiderwort.	Cleòme púngens.	Caper,	Capparidaceæ.	"	"	"
Sunflower.	Heliánthus ánnuus.	Composite,	Compositæ.	Monopetalous.	"	"
Verbena, Scarlet..	Verbèna chamædrifòlia.	Vervain,	Verbenaceæ.	"	"	"
Violet.	Viòla cucullàta.	Violet,	Violaceæ.	Polypetalous.	"	"
Zinnia.	Zínnia élegans.	Composite,	Compositæ.	Monopetalous.	"	"

WILD FLOWERS AND WEEDS.

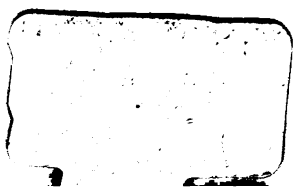
Familiar Name.	*Botanical Name.*	*Family, or Order.*		*Division.*	*Sub-Class.*	*Class.*
Anemone.	Anemòne nemoròsa.	Crowfoot,	Ranunculaceæ.	Apetalous.	Angiosperms.	Exogens.
Bellwort.	Uvulària perfoliàta.	Lily,	Liliaceæ.	Petaloideous.	Aglumaceæ.	Endogens.
Bitter sweet.	See Wax-work.	Staff-tree,	Celestraceæ.	Polypetalous.	Angiosperms.	Exogens.
Bloodroot.	Saguinària Canadénsis.	Poppy,	Papaveraceæ.	"	"	"
Bluets.	Houstònia cærùlea.	Madder,	Rubiaceæ.	Monopetalous.	"	"
Bouncing Bet.	Saponària officinàlis.	Pink,	Caryophyllaceæ.	Polypetalous.	"	"
Butter-and-eggs.	Linària vulgàris.	Figwort,	Scrophulariaceæ.	Monopetalous.	"	"
Buttercup.	Ranúnculus àcris.	Crowfoot,	Ranunculaceæ.	Polypetalous.	"	"
Butterfly orchis.	Orchis Psychòdes.	Orchis,	Orchidaceæ.	Petaloideous.	Aglumaceæ.	Endogens.
Button bush.	Cephalánthus occidentàlis.	Madder,	Rubiaceæ.	Monopetalous.	Angiosperms.	Exogens.
Calamus.	Ácorus Cálamus.	Arum,	Araceæ.	Spadiceous.	Aglumaceæ.	Endogens.
Catnip.	Népeta Catària.	Mint,	Labiatæ.	Monopetalous.	Angiosperms.	Exogens.
Cardinal flower.	Lobèlia cardinàlis.	Lobelia,	Lobeliaceæ.	"	"	"
Cinquefoil.	Potentílla Canadénsis.	Rose,	Rosaceæ.	Polypetalous.	"	"

Clover, Red.	Trifòlium praténse.	Pulse,	Leguminosæ.	"	"	"
Dandelion.	Taráxacum Dens-leònis.	Composite,	Compositæ.	Monopetalous.	"	"
Dog-tooth violet.	Erythrònium Americànum.	Lily,	Liliaceæ.	Petaloideous.	Aglumaceæ.	Endogens.
Dutchman's-breeches.	Dicéntra Cucullària.	Fumitory,	Fumariaceæ.	Polypetalous.	Angiosperms.	Exogens.
Dutchman's-pipe.	Aristòlochia Sìpho.	Birthwort,	Aristolochicaeæ.	Apetalous.	"	"
Eel-grass.	Valisnèria spiràlis.	Frogs-Bit,	Hydrocharidaceæ.	Spadiceous.	"	Endogens.
Everlasting, Common.	Gnaphàlium polycéphalum.	Composite,	Compositæ.	Monopetalous.	Angiosperms.	Exogens.
Daisy, Ox-eye.	Chrysánthemum Leucánthemum.	Composite,	Compositæ.	"	"	"
Ginseng.	Aràlia quinquefòlia.	Ginseng,	Araliaceæ.	Polypetalous.	"	"
Golden rod.	Solidàgo rígida.	Composite,	Compositæ.	Monopetalous.	"	"
Goldthread.	Cóptis trifòlia.	Crowfoot,	Ranunculaceæ.	Polypetalous.	"	"
Hepatica.	Hepática tríloba.	Crowfoot,	Ranunculaceæ.	Apetalous.	"	"
Herb Robert.	Geràniun Robertiànum.	Geranium,	Geraniaceæ.	Polypetalous.	"	"
Indian turnip.	Arisæma triphýllum.	Arum,	Araceæ.	Spadiceous.	Aglumaceæ.	Endogens.
Jewel-weed.	Impàtiens pállida.	Geranium,	Geraniaceæ.	Polypetalous.	Angiosperms.	Exogens.
Lady's slipper, Stemless.	Cypripèdium acaùle.	Orchis,	Orchidaceæ.	Petaloideous.	Aglumaceæ.	Endogens.
Madder.	Rùbia tinctòria.	Madder,	Rubiaceæ.	Monopetalous.	Angiosperms.	Exogens.
Marsh mallow.	Althæa officinàlis.	Mallow,	Malvaceæ.	Polypetalous.	"	"
May apple.	Podophýllum peltàtum.	Barberry,	Berberidaceæ.	"	"	"
Meadow rue.	Thalíctrum Cornùti.	Crowfoot,	Ranunculaceæ.	Apetalous.	"	"
Milkweed.	Asclèpias Cornùti.	Milkweed,	Asclepiadaceæ.	Monopetalous.	"	"
Mullein.	Verbáscum Thápsus.	Figwort,	Scrophulariaceæ.	"	"	"
Orchis, Showy.	Órchis spectábilis.	Orchis,	Orchidaceæ.	Petaloideous.	Aglumaceæ.	Endogens.
Ox-eye.	Heliópsus lævis.	Composite,	Compositæ.	Monopetalous.	Angiosperms.	Exogens.
Pitcher-plant.	Sarracènia purpùrea.	Pitcher-plant,	Sarraceniaceæ.	Polypetalous.	"	"
Plantain.	Plàntago màjor.	Plantain,	Plantaginaceæ.	Monopetalous.	"	"
Poke.	Phytolácca decándra.	Pokeweed,	Phytolaccaceæ.	Apetalous.	"	"

WILD FLOWERS AND WEEDS. — *Continued.*

Familiar Name.	*Botanical Name.*	*Family, or Order.*		*Division.*	*Sub-Class.*	*Class.*
Purple-fringed orchis.	Habenària fimbriàta.	Orchis,	Orchidaceæ.	Petaloideous.	Aglumaceæ.	Endogens.
Shepherd's purse.	Capsélla Bursa-Pastòris.	Mustard,	Cruciferæ.	Polypetalous.	Angiosperms.	Exogens.
Solomon's seal.	Polygonàtum biflòrum.	Lily,	Liliaceæ.	Petaloideous.	Aglumaceæ.	Endogens.
Spring beauty.	Claytònia Virgìnica.	Purslane,	Portulacaceæ.	Polypetalous.	Angiosperms.	Exogens.
Spurrey.	Spérgula arvénis.	Pink,	Caryophyllaceæ.	"	"	"
Star of Bethlehem.	Ornithógalum umbellàtum.	Lily,	Liliaceæ.	Petaloideous.	Aglumaceæ.	Endogens.
St. John's wort.	Hypéricum perforàtum.	St. John's wort,	Hypericaceæ.	Polypetalous.	Angiosperms.	Exogens.
Sweet brier.	Ròsa rubiginòsa.	Rose,	Rosaceæ.	"	"	"
Sweet fern.	Comptònia asplenifòlia.	Sweet gale,	Myricaceæ.	Apetalous.	"	"
Sundew.	Drósera rotundifòlia.	Sundew,	Droseraceæ.	Polypetalous.	"	"
Thistle.	Círsium lanceolàtum.	Composite,	Compositæ.	Monopetalous.	"	"
Ten-o'clock.	See Star of Bethlehem.	Lily,	Liliaceæ.	Petaloideous.	Aglumaceæ.	Endogens.
Trailing arbutus.	Epigæa rèpens.	Heath,	Ericaceæ.	Monopetalous.	Angiosperms.	Exogens.
Vetch.	Vícia Americàna.	Pulse,	Leguminosæ.	Polypetalous.	"	"
Water-lily.	Nymphæa odoràta.	Water-lily,	Nymphæaceæ.	"	"	"
Wild columbine.	Aquilègia Canadénsis.	Crowfoot,	Ranunculaceæ.	"	"	"
Wild rose. Eglantine.	Ròsa lùcida.	Rose,	Rosaceæ.	"	"	"
Wood-sorrel.	Óxalis strícta.	Geranium,	Geraniaceæ.	"	"	"
Yarrow.	Achillèa Millefòlium.	Composite,	Compositæ.	Monopetalous.	"	"
Yel. lady's-slipper.	Cypripèdium pubéscens.	Orchid,	Orchidaceæ.	Petaloideous.	Aglumaceæ.	Endogens.
Yellow pond-lily.	Nùphar ádvena.	Water-lily,	Nymphæaceæ.	Polypetalous.	Angiosperms.	Exogens.

FERNS, MOSSES, ETC.

Familiar Name.	*Botanical Name.*	*Family, or Order.*		*Division, or Cohort.*	*Sub-Class.*	*Class.*
Apple-moss.	Bartràmia pomifórmis.	Moss,	Musci.	Axogamia.	Angiosporæ.	Acrogens.
Brake, Common.	Ptèris aquilìna.	Fern,	Filices.	Thallogamia.	"	"
Cinnamon fern.	Osmúnda cinnamòmea.	Fern,	Filices.	"	"	"
Climbing fern.	Lygòdium palmàta.	Fern,	Filices.	"	"	"
Club-moss.	Lycopòdium clavàtum.	Club-moss,	Lycopodiaceæ.	Sporogamia.	"	"
Ground pine.	Lycopòdium dendróideum.	Club-moss,	Lycopodiaceæ.	"	"	"
Horse-tail, Common.	Equistèum arvénse.	Horse-tail,	Equisetaceæ.	"	"	"
Interrupted fern.	Osmúnda Claytoniàna.	Fern,	Filices.	Thallogamia.	"	"
Maiden-hair fern.	Adiántum pedàtum.	Fern,	Filices.	"	"	"
Pigeon-wheat.	Polýtrichum commùne.	Moss,	Musci.	Axogamia.	"	"
Pipes.	Equistèum limòsum.	Horse-tail,	Equisetaceæ.	Sporogamia.	"	"
Polypod, Common.	Polypòdium vulgàre.	Fern.	Filices.	Thallogamia.	"	"
Quillwort.	Isosètes lacústris.	Pepperworts,	Marsileaceæ.	Sporogamia.	"	"
Resurrection plant. / Bird's-nest moss.	Selaginélla lepidophýlla.	Club-moss,	Lycopodiaceæ.	"	"	"
Royal Osmund.	Osmúnda regàlis.	Fern,	Filices.	Thallogamia.	"	"
Scouring rush.	Equistèum hyemàle.	Horse-tail,	Equisetaceæ.	Sporogamia.	"	"

Press of
Berwick & Smith,
Boston.